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RICHARDS, O. W., M.A., D.Sc. The British BETHYLIDAE (*s.l.*) (Hymenoptera) . . . 185–344, 111 figs.

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THE BRITISH BETHYLIDAE (*S.L.*) (HYMENOPTERA)

By O. W. Richards, M.A., D.Sc.

With One Hundred and Eleven Figures.

(Read 1st March, 1939.)

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1. Introduction.

The Bethylidae (*s.l.*) is a family [1] of the Hymenoptera whose study has been much neglected in this country. Although the species are not numerous, it has been almost impossible to get them authoritatively identified, chiefly because the keys to species in Kieffer's world monograph (1914) are quite unworkable. The present paper is an attempt to fill this gap.

Most of the Bethylids are rare and it is difficult to obtain adequate material of many of them. Previous records have so often been based on misdeterminations that they have largely been ignored in the present paper. The present work has been made possible by the kindness of a number of entomologists who have given, or lent me, specimens. In the following list of gentlemen who have helped me in this way, some of the names are followed by the abbreviations which I have used to indicate the source of specimens mentioned in the text. The abbreviations sometimes refer to the collector of the specimen, sometimes to a Museum of which I examined the collection. I have been much indebted to the following: Mr. R. B. Benson, British Museum (Natural History) (Brit. Mus. coll., B.M.; Fitch coll., F.[2]), Mons. L. Berland, Muséum national d' Histoire naturelle, Paris (P.), Herr Prof. Dr. H. Bischoff, Zoologische Museum d. Universität, Berlin, Dr. K. G. Blair (Bl.), Mr. H. Britten, Manchester Museum

[1] The questions as to whether the Dryinidae and their allies really constitute separate families and what are the relations of these families to other Hymenoptera are not discussed in the present paper.

[2] For interpreting the locality abbreviations used by Rev. T. A. Marshall on labels in the Fitch coll., see Morley (1915).

(B.), Prof. G. D. H. Carpenter, Hope Museum, Oxford (general coll., H.W.; Dale coll., H.D.), Mr. H. W. Daltry, Mr. C. Diver, Mr. H. St. J. K. Donisthorpe (Donisthorpe coll., now in Brit. Mus., B.M.D.), Mr. P. Freeman, Mr. K. M. Guichard, Mr. H. M. Hallett, Mr. A. H. Hamm (H.), Herr Dr. H. Haupt (Halle), Dr. B. M. Hobby, Dr. A. D. Imms, Zoological Museum, Cambridge (Ca.), Dr. N. A. Kemner, Zoologiske Institut, Lund, Mr. J. Kerrich, late of Dept. Zoology, Glasgow University (G.), Mr. D. J. Mahoney, National Museum, Melbourne (Curtis coll., C.), Herr Prof. Dr. F. Maidl, Naturhistorisches Museum, Wien, Mr. Claud Morley (Mr. Morley's coll. includes the Chitty types, M.), Mr. Jas. Murray, Mr. G. E. J. Nixon (whose Bethylids are now in my collection), Mr. J. F. Perkins, British Museum (Natural History), Herr Prof. Dr. A. Reichensperger, Zoologische Museum d. Universität, Bonn, Dr. A. Roman, Zoologiske Museum, Stockholm, Herr Prof. Dr. O. Schröder, Universitäts Museum, Kiel, Mr. A. W. Stelfox, National Museum of Ireland, Dublin (museum coll., D.; A. W. Stelfox coll., A.W.S.), and Mr. G. C. Varley.

I wish especially to thank Mr. R. B. Benson and Prof. J. W. Munro for putting at my disposal the facilities of the British Museum (Natural History) and the Department of Zoology and Applied Entomology, Imperial College of Science, respectively; Mr. A. W. Stelfox for his repeated kindness in helping me to study the Haliday collection and his own valuable specimens; and Mr. J. F. Perkins, who very kindly examined specimens at Lund and Stockholm for me.

I have already (Richards, 1936a) dealt with certain types of species described by Kieffer from the P. Cameron collection (B.M.). The decision as to which specimens are types is made easier by examining Cameron's paper recording the determinations (Cameron, 1907).

The following explanations will aid in understanding certain descriptive terms used on later pages. The mesonotum in many Bethylidae (*s.l.*) is crossed by two pairs of furrows. The two inner furrows, commonly known as the parapsidal furrows, are the notaulices; Ogloblin (1924) has already indicated that they correspond to the "Mayrian furrows" of ants. They start at the anterior margin. The true parapsidal furrows are the outer ones which begin at the posterior margin.

In describing the male genitalia, I have used the terminology of Peck (1937). This differs only to a small extent from that previously employed by myself and many other entomologists. The following correspondences may be noticed: gonocardo = cardo; gonostipes = stipes; gonosquama = squama; gonoforceps = stipes + squama, when fused; volsella, divided into disti- and basivolsella; aedeagus made up of two parameres = sagittae.

2. Key for separating British Bethylidae (*s.l.*) from the other Clistogastra.

1. Winged species, hind-wings with an anal lobe, sometimes very small (*Cephalonomia*, *Plastanoxus*) . . . . . 2.
–. Winged species; hind-wings with no anal lobe. Parasitica and some Aculeata.
–. Apterous or brachypterous species . . . . . 8.
2. First abdominal segment sharply marked off from the rest, usually scale-like. Antennae with 10–13 segments . . . . . Formicidae.
–. First abdominal segment not scale-like and sharply marked off from the rest, at least dorsally, or else strongly petiolate . . . . . 3.
3. Antennae with 12–13 segments . . . . . 4.

–. Antennae with 10 segments . . . . . 5.
4. Head ovoid or transverse, mouth directed downwards. Venation nearly always much more complete or the insect is largely of a metallic colour Aculeata.
–. Head flattened, often rather elongate, mouth directed forwards. Venation more or less, usually greatly, reduced . . . . . Bethylidae.
5. Front tarsi chelate. Fore-wings with two closed basal cells as well as the costal cell . . . . . Dryinidae (Dryininae) ♀♀.
–. Front tarsi not chelate . . . . . 6.
6. Fore-wings with seven more or less completely closed cells. Head pyriform, narrowed towards the mouth, antennae inserted on a prominence well above clypeus . . . . . Dryinidae (Emboleminae) ♂♂.
–. Fore-wings with not more than three closed cells. Head transverse, little narrowed towards the mouth, antennae inserted very close to the clypeus 7.
7. Fore-wings with a costal and two closed basal cells. Antennal segments often rather elongate, with long pubescence . Dryinidae (Dryininae) ♂♂.
–. Fore-wings with only the costal cell closed . Antennal segments shorter (♂ not very different from ♀), pubescence only moderately long even in the ♂ . . . . . Dryinidae (Aphelopinae).
8. Propodeum narrowed in front, forming a deep constriction in the dorsal view of the thoracic region.
Tibiae spiny. Antennae with 13 segments . . . . . 9.
–. Propodeum not strongly constricted anteriorly . . . . . 10.
9. Head ovoid, mouth directed downwards . . . . . Methocidae.
–. Head flattened, rectangular, mouth directed forwards . . . Bethylidae.
10. Antennae with 13 or more segments. If with 13 often strongly geniculate and/or clubbed. (In the Chalcididae segments 3 or 3 and 4 are usually microscopic) . . . . . Various Parasitica.
—. Antennae with 12 segments or less . . . . . 11.
11. Abdomen with first segment sharply marked off from the rest, usually scale-like. Antennae with 10–12 segments . . . . . Formicidae.
—. Abdomen with first segment not sharply marked off, at least dorsally, not scale-like . . . . . 12.
12. Scutellum divided into three parts by two furrows which diverge outwards and backwards from the middle of the anterior margin. Antennae strongly geniculate with 9–11 segments . . . . . Ceraphronidae.
—. Scutellum not thus divided . . . . . 13.
13. Sides of abdomen strong margined and deflexed. Antennae strongly geniculate with 7–12 segments . . . . . Scelionidae.
—. Sides of abdomen not strongly margined . . . . . 14.
14. Antennae clubbed, with 11–14 segments . . . . . Diapriidae.
—. Antennae not clubbed. . . . . 15.
15. Antennae with 12 segments. Tarsi with five segments . . . . . 16.
—. Antennae with 10 segments or less, or tarsi with four segments . . . 17.
16. Species with very evident pubescence, especially on the abdomen Mutillidae and Myrmosidae.
—. Species nearly glabrous, head more flattened, mouth directed more forwards . . . . . Bethylidae.
17. Tarsi with four segments. Length under 2 mm. Chalcididae (Trichogrammatinae) or Mymaridae.
—. Tarsi with five segments. Length at least 2 mm. Antennae with 10 segments . . . . . 18.
18. Front tarsi chelate. Head transverse, antennae inserted close to clypeus Dryinidae (Dryininae) ♀♀
—. Front tarsi simple. Head pyriform, antennae inserted on a prominence high above the clypeus . . . . . Dryinidae (Emboleminae) ♀♀.

3. The Classification of the Dryinidae.

The present classification of the Dryinidae is largely based on the classical investigations of Perkins (1905, 1906). The system I am adopting only differs from his in a few minor details, *e.g.* in including a few genera subsequently described and in defining a new tribe for the aberrant genus *Bocchus* Ashmd. The principal difficulties arise in the males and in certain apterous forms. The key to the subfamilies of the males is very provisional as many of the males are still unknown. The anomalous genus *Aphelopus* Dalm. has usually been considered to form a subfamily of the Dryinidae, but it is uncertain how closely it is allied; I am leaving it as a subfamily in the present paper. The Emboleminae, usually regarded as a separate family, are also I think best treated as a subfamily or at any rate given the same rank as the Aphelopinae. The separation of these sub-families will be aided by the key (p. 186) adapted for the use of British species. The classification of the Dryininae which I propose can also be set out in the form of a key.

Key to the tribes of the Dryininae.

Females.

1. Occiput nowhere margined.
   (Maxillary palpi with less than six segments, except in *Chalcogonatopus* Perk. and *Eucamptonyx* Perk. Species apterous with the mesonotum forming a stalk between the pro- and metanotum, except *Echthrodelphax* which is fully winged and has a very narrow pterostigma. Front trochanter about two and a half times longer than broad, fore basitarsus and fourth tarsal segment both very elongate and of about equal length, third tarsal segment produced into a hook, mobile part of fifth segment much longer than the part articulating with fourth, rudimentary claw present besides the enlarged claw. Eyes bare. Malar space without a furrow or keel connecting the lower corner of the eye with the base of mandibles. Parasites of Jassids and Fulgorids). . . . . Gonatopodini.[3]
–. Occiput margined, at least along a short piece behind the ocelli. Maxillary palpi with six segments.
   (Of the species examined only *Psilodryinus rugidorsalis* Turner, 1928 has the margin very indistinct, but it clearly belongs to the Dryinini on all other characters) . . . . . 2.
2. Mandibles tridentate.
   (Antennae short. Malar space without furrow or keels connecting the lower corner of the eyes to the base of mandibles. Eyes bare or hairy. Occipital margin complete. Pronotum long and somewhat contracted where it meets the mesonotum. Fore trochanter not more than twice as long as broad, basitarsus much longer than any other segment, but fourth segment also sometimes quite elongate, third tarsal segment bearing very long hairs and sometimes produced laterally, mobile part of fifth segment much longer than the part articulating with the fourth and bearing only one articulated spine or a row of bristles, enlarged claw smooth or *serrate* beneath (not with articulated spines or lamellae, or with one spine only in *B. mirabilis* (Perk.)), rudimentary claw present. Dorsal surface of propodeum much shorter than posterior one. Pterostigma more or less lanceolate in species with developed wings. Abdomen sometimes with a very distinct petiole. Parasites of Issidae and Jassidae. Species

[3] *Trichogonatopus* Kieff., usually placed here, probably belongs to the Dryinini, *q.v.* The genus *Gynochelys* Brues, also placed here by Kieffer, belongs to the Anteonini, *q.v.*

examined: *Mystrophorus formicaeformis* Ruthe, *Bocchus mirabilis* (Perkins, 1905) and an undescribed S. African species of *Bocchus* which has a row of bristles on the fifth tarsal segment, but no articulated spine.)

Bocchini [4] **tribe n.**

–. Mandibles quadridentate. Abdomen only very shortly petiolate . . . 3.

3. Fore trochanter much longer than broad. Dorsal surface of propodeum nearly as long or longer than the posterior one. Sides of pronotum more or less distinctly convex, contracted where they meet the mesonotum, dorsal surface also swollen and sinking to the point of articulation.

(Occipital margin often visible only dorsally, rarely almost obsolete. Malar space often without keel and apparently always without furrow connecting lower corner of eye with base of mandibles. Eyes bare. Antennae usually very elongate. First and fourth fore tarsal segments very elongate, third segment produced into a hook, fifth segment with the mobile part much longer than the part articulated to the fourth, enlarged claw nearly always bearing spines or lamellae, rudimentary claw present. Species usually winged with a lanceolate pterostigma, but *Apterodryinus* Perkins, 1907 is apterous. Parasites of Fulgorids. Non-British genera examined: *Neodryinus* Perk., *Paradryinus* Perk., *Hesperodryinus* Perk., *Chlorodryinus* Perk., *Psilodryinus* Kieff., *Apterodryinus*, Perk.). . . . . Dryinini.[5]

Fore trochanter not or only a little longer than broad. Dorsal surface of propodeum much shorter than the posterior one. Pronotum often widening posteriorly, never distinctly constricted where it meets the mesonotum, nor dorsally convex and depressed towards point of articulation.

[4] This includes *Bocchus* Ashmead, 1893 (= *Phorbas* Ashmead, 1873 *nec* Duchassaing and Michelotti, 1864 = *Eukoebeleia* Perkins, 1905 = *Phorbasia* Kieffer, 1914). The two species I have examined are very short-winged, but some N. American species are fully winged. If Kieffer's descriptions of *Plastodryinus szepligetii* (Kieffer, 1905) and *Tetradryinus flavipes* (Kieffer, 1906a) are correct, those species probably belong here also but the diagnosis of the subfamily would have to be a little modified. Unfortunately Kieffer's descriptions are very unreliable and specimens have not been available for study. *Dryinus nigricans* Cameron, 1888, which Kieffer (1914 : 43) doubtfully placed in *Plastodryinus* is actually an Anteonine allied to *Anteon* subgenus *Chelogynus*. *Dryinus melanocephalus* Cameron, 1888, placed by Kieffer (1914 : 46) in *Bocchus*, really belongs to the same undescribed genus as *D. nigricans* Cam. See also *Prodryinus* mentioned under the Dryinini. *Mystrophorus formicaeformis* Ruthe, kindly sent to me by Herr Dr. H. Haupt, who has bred it from *Deltocephalus* sp., seems to be allied to these American species. The mandibles are tridentate with traces of a very short fourth one between the ventral and penultimate large ones; the chela is of the same type, though the enlarged claw is unarmed. The bare eyes, short trochanter and sessile abdomen resemble those of an Anteonine.

[5] The following genera have been placed in the Dryinini. (1) *Lonchodryinus* Kieffer, 1905a. I have not examined this genus but it seems clearly to belong here in spite of the unarmed front claw. (2) *Campylonyx* Westwood, 1835 does not seem to have been re-examined since it was described; it almost certainly belongs here. (3) *Prodryinus* Kieffer, 1906 with type *Dryinus brachycerus* Kieffer, 1905b is a composite genus. The type species is stated to have tridentate mandibles; if this is correct it probably belongs to the Bocchini. *Dryinus ormenidis* Ashmead, 1903, *D. alticolus* Cameron, 1888 and *D. maculicornis* Cameron, 1888, which Kieffer placed doubtfully in *Prodryinus*, belong to *Psilodryinus* Kieffer, 1906. (4) *Gonatopus alatus* Cresson, 1872, which Kieffer placed in *Mesodryinus* Kieffer, 1906, is (according to a specimen in the British Museum) an Anteonine. (5) *Trichogonatopus* Kieffer, 1909, which he placed in the Gonatopodini, is clearly a Dryinine if the description is accurate and forms the second apterous genus in the subfamily. (6) *Liodryinus doddi* (Kieffer, 1911), of which I have examined the type, is an Anteonine, near *Anteon* subgenus *Chelogynus*. (7) The enlarged front tarsal claw is supposed to be completely unarmed in the Dryinine genera *Lonchodryinus* Kieff., *Chelothelius* Reinh., *Mercetia* Kieff. and *Psilodryinus* Kieff.; otherwise it is more or less armed. Some species of *Psilodryinus* have been bred from Fulgorids and these are the only Dryinids with unarmed claws which are parasitic on that group of Homoptera.

(Occipital keel complete, encircling the foramen. Malar space usually with a strong furrow joining the lower corner of eye to base of mandibles. Eyes usually bare, hairy in *Lasianteon* Kieffer and microscopically so in some *Anteon* subgenus *Chelogynus* Hal. Fore tarsal segments shorter than in the Dryinini, third or fourth segments produced into a slight hook, mobile part of fifth segment sometimes no longer than the part articulating with the fourth, enlarged claw always unarmed, rudimentary claw absent. Species usually winged, pterostigma usually broader and less lanceolate. Parasites of Jassids, including BYTHOSCOPINAE) . . . . . Anteonini.[6]

Males (*provisional key*).

Species always fully winged.

1. Mandibles quadridentate. Occipital margin complete. Male usually not unlike the corresponding female. Maxillary palpi with six segments Anteonini.
–. Mandibles tridentate . . . . . 2.
2. Maxillary palpi with less than six segments. Eyes usually hairy . . . 3.
–. Maxillary palpi with six segments. Eyes usually bare. Occipital margin absent or incomplete . . . . . Dryinini.
3. Hind ocelli much nearer to one another than they are to eyes, ocelli being arranged in a nearly equilateral triangle. Occipital margin complete Bocchini **tribe n.**
–. Hind ocelli at least as far from one another as they are from eyes. No occipital margin . . . . . Gonatopodini.

4. The biology of the DRYININAE.

Most of what is known of the biology of the DRYININAE is based on the researches of Dr. R. C. L. Perkins (1905, 1906) and his colleagues, in Hawaii, and of Fenton (1918), in N. America. Some of the Japanese papers have not been properly studied owing to the language difficulty. Other workers have only added very fragmentary notes.

The DRYININAE are all parasites of Homoptera Auchenorrhyncha. The female, according to the species, catches with her modified fore-leg an adult or nymph of the host, stings it to insensibility and lays an egg on it. Sometimes she also bites the hopper with her mandibles. The hopper soon (about five minutes) recovers and runs about normally again. The egg appears always to be inserted between two overlapping sclerites and though it is usually invisible it appears that it might be regarded as morphologically external. The larva is at first invisible but begins to show as a black or dark brown sac in a few days. This sac is composed of the cast larval skins, so that with each moult an extra piece is added to the sac. There appear to be normally five moults. In the earlier part of the larval life the host seems to be little inconvenienced though it no longer grows. Just before the larva is full grown, it eats out all the contents of the host which normally dies firmly fixed to the

[6] The following forms, besides those usually placed here, are members of the Anteonini. (1) *Liodryinus* Kieffer and other supposed Dryinini mentioned in the note on that subfamily. (2) *Deinodryinus* Perkins, 1907. I have examined this genus and agree with Perkins that it belongs here in spite of the rather narrow pterostigma. (3) *Gynochelys* Brues, 1906, based on *G. braunsi* Brues, 1906. I have examined specimens of the type-species and of several other undescribed S. African species. They clearly belong to the Anteonini, though the wings are more reduced and the thorax more modified than in such brachypterous forms as occur in *Prenanteon* Kieffer.

food-plant. On completion of feeding, the larva splits open the sac and crawls out. Although legless, it moves about quite actively; most of the British species I have examined pupate on the food-plant, but probably others (like several non-British species) pupate in the soil. The cocoon is of dense silk, often with an inner closely fitting lining. The structure of the larva has been described by Mik (1882), Fenton (1918) and Haupt (1932). In the last larval instar the mouth-parts are relatively complete. A comparative study of the larvae of different genera would probably be a considerable help in classifying the group.

In many cases the males are very rare and probably in some species absent—see Perkins (1905 : 12–13). Fenton (1918 : 251) proved that *Gonatopus contortulus* Patton could produce females parthenogenetically and he notes several species in which no males are known. I believe that the commonest British species, *G. sepsoides* Westw., resembles *G. contortulus* in this respect.

The number of generations a year of British species seems to be either one (e.g. *Anteon brachycerum* (Dalm.)) or two (e.g. *Gonatopus sepsoides* (Westw.)), the winter being passed in the cocoon. In my experience it is easy to breed out non-hibernating cocoons but difficult to bring them through the winter.

Donisthorpe (1927, 1927a) and others have recorded the occurrence of several species of Gonatopodini in more or less close association with ants. He suggests that this is an example of mimicry, stating " they no doubt obtain protection from their likeness to the ants." No doubt some of the species are more or less ant-like, though they can usually be recognised with considerable certainty by their different method of walking. Most of the British forms resemble *Lasius niger* (L.) or *Formica fusca* L., though they have also been found with other species. It appears more probable that where ants and Gonatopodini have been found together it is due merely to some overlapping of their habitats; the enumeration of the occasions when insects of the two groups have been captured together has by itself little value, since it takes no account of the numerous Gonatopodini which have been taken on occasions when ants were absent.

One exotic Dryinid, *Paranteon myrmecophilus* Perkins, 1905 appears to be definitely myrmecophilous. Perkins described (1905 : 11) the behaviour of the species which is only moderately ant-like in appearance. It parasitises leaf-hoppers which are much attended by ants.

The evolution of the peculiar structure of such specialised Dryinids as *Gonatopus* has already been ably discussed by Perkins (1905 : 20–26). A certain amount of additional information is now available. Within the Dryininae, three different processes have happened simultaneously: (1) reduction of the wings, with the associated reduction of the meso- and metathorax; (2) reduction of the mouth-parts; (3) evolution of a more mobile, larger and probably more efficient chela on the fore legs.

The chief modification of Perkins' presentation of the data is due to the recognition that some of the processes have happened independently more than once. In the males, only process (2) has taken place, so that they become progressively more and more unlike the corresponding female.

(1) *Reduction of wings.*

Each of the four tribes shows two or more stages, but the Anteonini provide the best material. The ordinary species of *Anteon* Jur. are fully winged, but *A.* (*Chelogynus*) *cameroni* Kieff. has them a little shortened. In *Prenanteon ruficornis* (Dalm.) varieties occur with wings either rather short or quite scale-

like, but the thorax is little modified. *Gynochelys* Brues is almost quite wingless with a thoracic structure approaching that of *Gonatopus* Ljungh.

In the Gonatopodini, *Echthrodelphax* Perk. is winged, but the other genera are apterous and show the greatest reduction of the thorax. The mesothorax becomes a small cylindrical stalk at the posterior margin of which a scutellar plate may be marked off (fig. 1). The sutures between the meso- and metathorax, and between the metathorax and propodeum show various stages in obliteration.

In the Bocchini, some species of *Bocchus* Ashm. are fully winged, others (as well as *Mystrophorus* Först.) very short-winged, but the thorax is not much modified.

In the Dryinini, most species are winged, though the wings are often relatively short; *Apterodryinus* Perk. is apterous and *Gonatopus*-like, with a very modified thorax.

Apparently even the fully winged species are not very active fliers and spend most of their time running about on plants.

(2) *Reduction of the mouth-parts.*

This affects principally the number of mandibular teeth and of palp-segments. The males, if differing from the corresponding females, show greater reduction. The glossa (cf. figs. 13–16) is very rough, possibly to enable the females to scrape fluid from their prey when they malaxate it.

The data as to reduction may be concisely summarised as follows.

Maxillary palp-segments	Labial palp-segments	Mandibular teeth	Dryinid group
6	3	4	Anteonini Dryinini ♀ *Chalcogonatopus* (Gonatopodini)
6	3	3	Dryinini ♂ Bocchini ♀ (? ♂)
2–5	1–3	4	Gonatopodini ♀ (except *Chalcogonatopus*)
2–5	1–3	3	Gonatopodini ♂

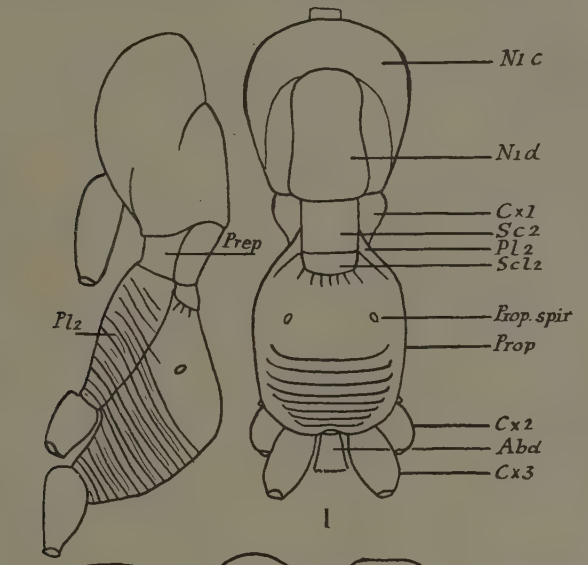
No Dryinid has the four labial palp-segments which are characteristic of unspecialised Hymenoptera.

(3) *Evolution of the chelate fore-leg.*

All female Dryininae have relatively elongate fore coxae and one claw enlarged and apposable against the modified fifth tarsal segment but there are large differences between unspecialised forms such as *Anteon* Jur. and the most evolved types. The changes affect the pronotum (probably in relation to the increased musculature of the fore legs in specialised types), the fore trochanter, the length of the segments of the fore tarsi, the development of hooks on the intermediate tarsal segments, the length of the free part of segment 5, the armature of segment 5, the armature of the enlarged claw, and the development of the second claw. The data can be presented in the form of a table (p. 194).

Again, several stages are shown within the Anteonini, though none of them

appears to reach the advanced condition of the Dryinini and Gonatopodini. It is somewhat surprising that the small claw has been lost in the Anteonini and retained in the other three groups, since one might have expected it to be absent (in view of its lack of function in all groups) in the more specialised types. The presence of lamellae on the enlarged claw is associated with



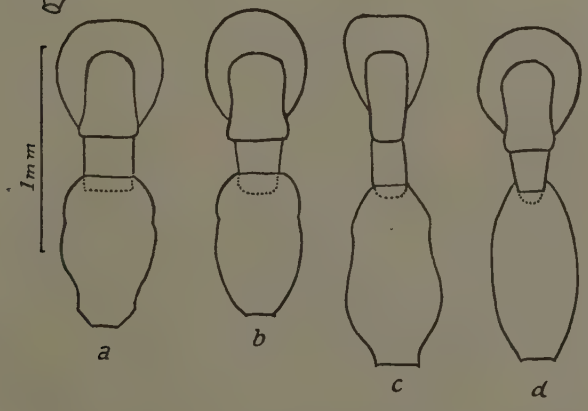


FIG. 1.—Dorsal and lateral views of the thorax and propodeum in a Gonatopodine ♀. Abd. abdomen; cx. 1, 2, 3. coxae; N_1 c. pronotal collar; N_1 d. disc of pronotum; Pl_2. mesopleuron; Prep. mesoprepectus; Prop. propodeum; Prop. spir. propodeal spiracle; Sc_2. mesonotum; Scl_2. scutellum.

FIG. 2.—Thorax and propodeum of (a) *Plectrogonatopus striatus* (Kieff.), (b) *Gonatopus sepsoides* Westw., (c) *Neogonatopus lunatus* (Klug), and (d) *N. distinguendus* (Kieff.) ♀♀, dorsal view.

Delphacid prey; certain species of *Psilodryinus* Kieff. with unarmed claws may prove to be exceptional in also attacking that family.

	Anteon Jur. *s.l.*	*Anteon* Jur. Group of *A. infectum* (Hal.)	*Anteon* Jur. Subg. *Chelogynus* Hal.)	*Prenanteon* Kieff.	Bocchini	Dryinini	Gonatopodini
Pronotum :							
Much broader than long	+	+	−	−	−	−	−
As long as broad	−	−	+	+	+ (somewhat contracted)	−	−
Very long, humped and constricted behind	−	−	−	−	−	+	+
Fore trochanter :							
At most a little longer than broad	+	+	+	+	−	−	−
About twice as long as broad	−	−	−	−	+	±	−
More than twice as long as broad	−	−	−	−	−	±	+
Fore tarsi :							
Segment 1 elongate, 2–4 short	+	−	−	−	+ (4 moderate)	−	−
Segments 1 & 4 elongate, 2–3 short	−	+	+	+ (4<1)	−	+	+
Segment 2 hooked	−	+	+	+	−	−	−
Segment 3 hooked	±	−	−	−	+	+	+
Segment 4 hooked	±	−	−	−	−	−	−
Mobile part of 5 very short	+	−	−	−	−	−	−
Mobile part of 5 [illegible]	−	−	−	+	−	−	−
Mobile part of 5 elongate	−	+	+	−	+	+	+
Segment 5 with lamellae distally only	+	−	−	−	+	−	−
Segment 5 with rows of lamellae	−	+	+	+ (small)	−	+	+
Enlarged claw at most with small bristle	+	+	+	+	−	±	±
Enlarged claw with lamellae	−	−	−	−	±	±	±
Small claw present	−	−	−	−	+	+	+
Small claw absent	+	+	+	+	−	−	−

5. The British genera and species of Gonatopodini.

It is impossible to recognise the genera in this group without dissecting out the mouth-parts and counting the palpal segments. Although this is not very difficult to do,[7] I have prepared a separate key to the species which does not involve the identification of genera.

I have found it necessary to erect a number of new genera for British species; doubtless many European and American species previously ascribed to "*Gonatopus*" will be found to belong to some of these genera. Before giving an account of the British fauna, I give a list of genera of the Gonatopodini together with their genotypes, fixing the latter where necessary. I found such a list an indispensable preliminary to the erection of new British genera.

[7] Even when unique specimens are involved, I find it possible to remove the mouth-parts without much damage to the head, using the following technique. Remove the head and boil it gently in water or *very weak* potash. If insufficiently boiled it is brittle, if boiled too much it becomes leathery. After the right amount of boiling, the mouth-parts can be pulled out with a fine needle, which must be made to pierce the gula area and then tear forwards. As a rule little damage is done to the dorsal side of the head.

Genera of the Gonatopodini.

1. *Gonatopus* Ljungh, 1810. Monobasic, type = *G. formicarius* Ljungh, 1810. (See p. 209.) Synonym *Digonatopus* Kieffer, 1913, genus no. 16.

2. *Dicondylus* Curtis, 1829–30. Type (fixed by Kieffer, 1914 : 73) = *Dryinus bicolor* Haliday *in* Curtis, 1828. (See p. 203.) Synonym *Laberius* Kieffer, 1914, genus no. 19.

3. *Labeo* Haliday, 1833 *nec* Cuvier, 1817. Monobasic, type = *Labeo vitripennis* Haliday, 1833 = *Dicondylus bicolor* (Haliday *in* Curtis, 1828). See *Laberius* Kieff. genus no. 19.

4. *Chalcogonatopus* Perkins, 1905. Type here fixed as *C. gigas* Perkins, 1905. U.S.A. and Australia. Characters : head excavated, maxillary and labial palpi with six and three segments, pronotum transversely impressed, enlarged claw without lamellae.

5. *Epigonatopus* Perkins, 1905. Monobasic, type = *E. solitarius* Perkins, 1905. U.S.A., Japan, Australia. Characters : both palpi with two segments, enlarged claw without lamellae, pronotum transversely impressed.

6. *Haplogonatopus* Perkins, 1905. Type here fixed as *H. americanus* Perkins, 1905. U.S.A., Japan, India, Philippines, Australia. Characters : head excavated, pronotum not impressed, both palpi with two segments, enlarged claw with lamellae and a preapical tooth.

7. *Neogonatopus* Perkins, 1905. Type here fixed as *N. ombrodes* Perkins, 1905. (See p. 214.) Synonyms : *Gonatopus* Kieffer *nec* Ljungh ; *Allogonatopus* Haupt, 1938, genus no. 23.

8. *Pachygonatopus* Perkins, 1905. Monobasic, type = *P. melanias* Perkins, 1905. Australia. Characters : vertex swollen, maxillary palpi with three, labial with two segments. Enlarged claw without lamellae.

9. *Paragonatopus* Perkins, 1905. Monobasic, type = *P. nigricans* Perkins, 1905. Australia. Characters : head slightly excavated, both palpi with two segments, pronotum transversely impressed, enlarged claw with lamellae and a preapical tooth.

10. *Pseudogonatopus* Perkins, 1905. Type here fixed as *P. dichromus* Perkins, 1905. (See p. 205.)

11. *Platygonatopus* Kieffer, 1906 (as subgenus of *Pachygonatopus*). Type here fixed as *Gonatopus planiceps* Kieffer, 1904a. (See p. 219.)

12. *Cyrtogonatopus* Kieffer, 1907a (as subgenus of *Pachygonatopus*). Monobasic, type = *Gonatopus breviforceps* Kieffer, 1904a. Patagonia. Characters : fourth segment of fore tarsi short, head not excavated, pronotum with a transverse impression, enlarged claw without lamellae.

13. *Agonatopoides* Perkins, 1907. Monobasic, type = *A. synchromus* Perkins, 1907. U.S.A. Characters : Head excavated, pronotum impressed, maxillary palpi with five segments, labial with three, enlarged claw with lamellae and preapical tooth.

14. *Agonatopus* Perkins, 1907. Type here fixed as *A. pallidicornis* Perkins, 1907. U.S.A., Japan. Characters : Head excavated, pronotum more or less impressed, maxillary palpi with five segments, labial with three, enlarged claw without lamellae.

15. *Eucamptonyx* Perkins, 1907. Monobasic, type = *E. testaceus* Perkins, 1907. U.S.A. Characters : Head excavated, pronotum transversely impressed, maxillary palpi with six segments, labial with three, enlarged claw with lamellae but no preapical tooth.

16. *Digonatopus* Kieffer, 1913. Monobasic,[8] type = *Gonatopus australiae* Perkins, 1905. Synonym of *Gonatopus* Ljungh, 1810, genus no. 1.

17. *Pristogonatopus* Kieffer, 1913. Monobasic, type [9] = *Gonatopus dentatiforceps* Kieffer, 1904a. Italy, U.S.A. Characters: enlarged claw saw-like, head excavated, pronotum transversely impressed.

18. *Trigonatopus* Kieffer, 1913. Monobasic, type = *Gonatopus bifarius* Kieffer, 1906. Corsica. Characters: head not excavated, pronotum transversely impressed, fore tarsi with fifth segment with two rows of three lamellae, enlarged claw with five lamellae but no preapical tooth.

19. *Laberius* Kieffer, 1914. Monobasic, type *Labeo vitripennis* Haliday, 1833 = *Dicondylus bicolor* (Haliday *in* Curtis, 1828). (See Richards, 1937: 118.) Synonym of *Dicondylus* Curtis, 1829–30, genus no. 2.

20. *Trichogonatopus* Hellén, 1930. (As subgenus of *Gonatopus*.) Monobasic, type = *Gonatopus* (*Trichogonatopus*) *lindbergi* Hellén, 1930. Preoccupied by *Trichogonatopus* Kieffer, 1909 (Dryinini). The type-species will have to be more fully described before its generic position can be ascertained.

21. *Metagonatopus* Ogloblin, 1932. Monobasic, type = *M. brasiliensis* Ogloblin, 1932. Brazil. Characters apparently very similar to *Pachygonatopus* Perkins.

22. *Laberinus* Ogloblin, 1932. Monobasic, type = *M. paranensis* Ogloblin, 1932. Brazil. A male of some undetermined Gonatopodine genus.

23. *Allogonatopus* Haupt, 1938. Type (by original designation) = *A. procerus* Haupt, 1938. The genus is a synonym of *Neogonatopus* Perkins, 1905, genus no. 7. The type species is very closely allied to *G. distinguendus* Kieff. The second species placed by Haupt in *Allogonatopus* belongs to a different genus, probably to an undescribed one.

The following genera should be removed from the Gonatopodini: *Gynochelys* Brues, 1906 (see p. 188), *Apterodryinus* Perkins, 1907 (see p. 189) and *Trichogonatopus* Kieffer, 1909 (see p. 189).

The males of the Dryininae, especially the Gonatopodini, are so different from their respective females that it has been a matter of great difficulty to deal with them at all. The most important advance in their study was the publication of the results of large-scale breeding by Perkins (1905). He recognised (p. 22) three groups:

A. Mandibles of ♂♀ quadridentate. Maxillary palpi with six segments, labial with three. (Pterostigma broad). Anteoninae.

B. Mandibles of ♂ tri-, of ♀ quadridentate. Maxillary palpi with six segments, labial with three. (Pterostigma lanceolate.) Dryinini and *Chalcogonatopus*.

C. Mandibles of ♂ tri-, of ♀ quadridentate. Maxillary palpi with less than six segments, labial palpi with two. (Pterostigma lanceolate, but female wingless except in *Echthrodelphax*.) Gonatopodini and *Echthrodelphax*.

Perkins states (p. 22) that, in so far as he has examined them, the males always agree with their females in the number of palpal segments. But it will be seen in his key to the males (p. 33) he does not classify that sex in the Gonatopodini. Fenton (1918: 259) attempts to separate the males of the

[8] Kieffer believed that the genus *Gonatopus* had maxillary palpi with four segments, while Perkins described a species of *Gonatopus* with five segments. Kieffer, therefore, erected a genus *Digonatopus* to replace *Gonatopus* Perkins; the latter was monotypic, and its type-species becomes the genotype of *Digonatopus* Kieffer.

[9] Kieffer (1914: 71) designated *Gonatopus sjöstedti* Kieffer, 1904a as the type, but this species was not originally included in the genus.

Dryinini and Gonatopodini by the arrangement of the ocelli, which in the first group form a triangle but in the second are almost in one line. This attempt, however, breaks down in the genus *Neodryinus* Perk. (Dryinini), in which the ocelli are in a straight line, as in the Gonatopodini.

The present study of the British species entails certain modifications in Perkins' scheme, since I have found species of Gonatopodini in which the labial palpi have one, two or three segments. I have also seen one British male Gonatopodine which has four and three palp-segments. There is further a number of males almost certainly belonging to *Dicondylus bicolor* (Hal. *in* Curt.) in which the palp segment-numbers are three to four and two (*i.e.* variable in the species). Moreover, two of the combinations of palp-number in the males (viz. 4, 3; 3, 2) are not found in any British female. I therefore conclude that in the Gonatopodini, unlike the Dryinini which were chiefly studied by Perkins, the sexes may differ in palp-segment number. Variation within the species has been recorded previously in the Braconid, *Diaeretes rapae* (Curt.), by Gahan (1913). Variation in palp-number between the sexes is very rare. It is known in the labial palpi of the Masarids, *Quartinia* and *Quartiniella*, where the male palpi have one segment and the female three (von Schulthess and Scott, 1932). (Cf. also the EMBOLEMINAE, p. 293.)

Key to the British genera of Gonatopodini.

Females.

1. Enlarged claw with a row of lamellae or (*Plectrogonatopus*) at least of peg-like structures; claw with a subapical or preapical tooth . . . . . 2.
–. Enlarged claw with no lamellae; with two microscopic hairs at base or with four or five such hairs (sometimes a little peg-like) along its whole length. Preapical tooth very weak. Labial palpi with two segments . 6.
2. Maxillary palpi with two segments, labial palpi with one. Pronotum not divided by a transverse impression. Enlarged claw with a subapical tooth . . . . . *Monogonatopus* gen. n. p. 200.
–. Maxillary palpi with four or five segments, labial palpi with two or three . 3.
3. Maxillary palpi with five segments, first small. Labial palpi with two segments. Pronotum with a transverse impression. Enlarged claw with a subapical tooth . . . . . *Donisthorpina* gen. n. p. 201.
–. Maxillary palpi with four segments, first small . . . . . 4.
4. Labial palpi with three segments. First segment of maxillary palpi more distinct. Pronotum with a transverse impression. Enlarged claw with a preapical tooth and six peg-like lamellae; fifth tarsal segment with several rows of long tapering lamellae . . *Plectrogonatopus* gen. n. p. 207.
–. Labial palpi with two segments. Lamellae on claw and fifth tarsal segment broad. Enlarged claw with a subapical tooth . . . . . 5.
5. Pronotum not crossed by an impression . . . *Dicondylus* Curtis p. 203.
–. Pronotum crossed by a distinct transverse impression *Pseudogonatopus* Perkins p. 205.
6. Maxillary palpi with five segments, first very small . . . . . 7.
–. Maxillary palpi with four segments, first very small . . . . . 8.
–. Maxillary palpi with two segments . . . . . 9.
7. Pronotum crossed by a transverse impression. Fifth tarsal segment with its inner edge straight bearing very small lamellae *Gonatopus* Ljungh p. 209.
8. Head flat between the eyes. Pronotum crossed by a transverse impression. Fifth tarsal segment with its inner edge straight. Non-British (*Platygonatopus* Kieffer p. 219.)

–. Head excavated between the eyes. Pronotum crossed by a transverse impression. Fifth tarsal segment with a more or less distinct prominence on its inner edge, distally more curved than in *Gonatopus*
Neogonatopus Perkins p. 214.

9. Ocelli in a triangle of which the posterior side is a little longer than the other two. Transverse impression of pronotum nearly obsolete. Inner edge of fifth tarsal segment with a prominence bearing four small lamellae . . . . . *Tetrodontochelys* gen. n. p. 217.

–. Ocelli very reduced, in a triangle of which the posterior side is about half the length of the other two. Transverse impression of pronotum obsolete. Fifth tarsal segment strongly curved, inner edge straight with fourteen lamellae. Antennae short and thick. Non-British
(*Epigonatopoides* gen. n. p. 221.)

Key to the British species of Gonatopodini.

Females.

1. Enlarged claw of fore tarsi with a row of lamellae or peg-like structures . 2.

–. Enlarged claw of fore tarsi with at most a row of microscopic hairs . . 7.

2. Pronotum with no transverse impression in front. Fifth tarsal segment with eight lamellae before distal end, claw with four or five and with a subapical tooth . . . . . 3.

–. Pronotum with a distinct transverse impression in front . . . . . 4.

3. Thorax and legs red-yellow. Posterior side of ocellar triangle two-thirds as long as other sides. Claw with five lamellae, fifth tarsal segment with two rows of six and two lamellae, respectively, and a distal group of three
oratorius (Westw.) p. 200.

–. Thorax black, pronotum mainly pale; legs mainly pale, but fore femora nearly always mainly black. Posterior side of ocellar triangle half as long as other sides. Claw with four or five lamellae, fifth tarsal segment with two rows of four and three to four lamellae, respectively, and a distal group of three . . . . . *bicolor* (Hal. *in* Curt.) p. 203.

4. Entirely brown species. Posterior side of ocellar triangle half as long as other sides. Antennae long and thin, proximally yellow, segment 3 as long as 4 + 5, 4 at least three times as long as broad. Posterior thoracic complex rather smooth, anteriorly and posteriorly with very strong regular striae. Claw with four lamellae and a subapical tooth, fifth tarsal segment with two rows of eight and nine lamellae, respectively and a distal group of six . . . . . *formicicola* sp. n. p. 201.

–. Species mainly black (except the legs). Claw with six or more lamellae, fifth tarsal segment with either two rows of altogether twenty-one lamellae, or with a very numerous distal group . . . . . 5.

5. Posterior side of ocellar triangle half as long as other sides. Penultimate antennal segment hardly longer than broad. Claw with six very small peg-like lamellae (half-hidden by knife-like edge of claw) and a preapical tooth. Fifth tarsal segment with two or three rows of long, tapering lamellae (thirty to forty in all) and a distal group of twenty to thirty . . . . . *striatus* (Kieff.) p. 208.

–. Posterior side of ocellar triangle two-thirds as long as other sides. Penultimate antennal segment more than one and a half times as long as broad. Claw with nine to twelve large lamellae, tooth subapical. Fifth tarsal segment with broader lamellae which are expanded at tip . . 6.

6. Antennae with segment 5 much longer than 2, 4 four times as long as broad. Claw with six to nine lamellae, fifth tarsal segment with two rows of

thirteen and eight lamellae, respectively, and a distal group of five to seven . . . . . *distinctus* (Kieff.) p. 205.

–. Antennae with segment 5 a little longer than 2, 4 hardly more than three times as long as broad. Claw with ten to twelve lamellae, fifth tarsal segment with two rows of eight lamellae each, and a distal group of about twenty-five . . . . . *separatus* sp. n. p. 207.

7. Transverse pronotal impression almost obsolete, pronotum smooth and shining. Posterior side of ocellar triangle rather longer than other sides. Penultimate antennal segment not twice as long as broad. Inner edge of fifth tarsal segment with small prominence bearing four small lamellae, and a distal group also of four . . . . . *ljunghii* (Westw.) p. 217.

–. Transverse pronotal impression distinct, the surface more or less strongly alutaceous . . . . . 8.

8. Posterior thoracic complex (fig. 2, d) smooth, nearly bare, not impressed in front before scutellum, and (not counting the mesonotum) more than twice as long as broad. Posterior side of ocellar triangle half as long as other sides. Antennae thread-like, penultimate segment more than twice as long as broad, segment 5 longer than 8. Stalk of hind femur very long. Claw with four inner bristles, fifth tarsal segment with ten lamellae on a prominence, and a distal group of five or six . . . . *distinguendus* (Kieff.) p. 214.

–. Posterior thoracic complex usually more rugose and more or less hairy, distinctly impressed before scutellum and down pleural suture, globose part behind impression not more than twice as long as broad . . . 9.

9. Antennae thread-like, penultimate segment more than twice as long as broad. Posterior side of ocellar triangle rather more than half as long as other sides. Posterior part of pronotum about twice as long as broad (fig. 2, c). Stalk of hind femur very long. Thoracic sternum, just in front of mid coxae, with a dense tuft of white hairs. Claw with four inner bristles, fifth tarsal segment with about twenty lamellae extending right to base, last fourteen on a very slight prominence, distal group of about fifteen . . . . . *lunatus* (Klug) p. 216.

–. Antennae thick with penultimate segment clearly less than twice as long as broad. Posterior thoracic complex (fig. 2, a) more convex, almost no impression behind the scutellum . . . . . *striatus* (Kieff.) p. 208.

–. Antennae thicker than in *lunatus* (Klug), with penultimate segment twice as long as broad. Posterior part of pronotum (fig. 2, b) about one and a half times as long as broad. Claw with only two proximal bristles, fifth tarsal segment with inner edge straight, bearing sixteen to twenty-three small lamellae, and a distal group of six to eight . . . . . 10.

10. Vertex less excavated, surface entirely dull and coarsely alutaceous. Posterior side of ocellar triangle half as long as the other sides. Pubescence longer and denser, especially on fore coxae and propodeum, moderately conspicuous even on abdomen. Striae of posterior thoracic complex indistinct . . . . . *barbatellus* sp. n. p. 213,

—. Vertex more excavated, area on each side of disc shining, not alutaceous. Pubescence shorter and sparser . . . . . 11.

11. Dorsal surface of posterior thoracic complex anteriorly smooth and shining, posteriorly distinctly striate. Posterior side of ocellar triangle half as long as other sides . . . . . *sepsoides* Westw. p. 210.

—. Dorsal surface of posterior thoracic complex evenly and rather coarsely alutaceous, striae almost completely obsolete. Posterior side of ocellar triangle nearly as long as other sides. Pubescence very reduced, short and inconspicuous even on the propodeum. Non-British (*formicarius* Ljungh p. 213.)

Males.

1. Antennal segment 3 less than three times as long as broad . . . . . 2.
–. Antennal segment 3 fully four times as long as broad. Labial palpi with two segments . . . . . 3.
2. Maxillary palpi with five, labial with three segments. Basal process of gonoforceps of genitalia long, narrow, sinuate. Ninth sternite with sixteen long bristles. . . . . Species 2.
–. Maxillary palpi with four segments (4 much longer than 3), labial with two. Basal process of gonoforceps rather broad and short. Ninth sternite with nine peg-like [10] bristles . . . . . Species 1.
3. Maxillary palpi with four clear segments (3 and 4 subequal). Basal process of gonoforceps of genitalia long and broad, serrate distally . . Species 3.
–. Maxillary palpi with three or four segments (4 more or less distinctly shorter than 3 or fused with it). Basal process of gonoforceps narrow without membranous extensions . . . . . Species 4.

Monogonatopus gen. n.

Female in most features similar to *Dicondylus* Curtis. Enlarged claw of fore tarsus with a subapical tooth and four or five rather narrow lamellae, fifth segment with a row of six lamellae and two others standing out of the row, distal group of three lamellae. Maxillary palpi with two segments, labial with one (fig. 3). Pronotum not crossed by a transverse impression.

Male unknown.

Genotype: *Gonatopus oratorius* Westwood, 1833a.

Monogonatopus oratorius (Westw.).

Gonatopus oratorius Westwood, 1833a; Richards, 1935.
Dicondylus oratorius Richards, 1936.

Testaceous, antennal segments imperfect but 1–3 are yellow and at least five penultimate ones black, occiput and posterior half of vertex brown to black, tarsal segment 5 of four hind legs brown, abdomen black. Insect almost entirely glabrous. Length 3·0 mm.

Vertex moderately excavated and emarginate behind, dull, closely alutaceous, with a moderate central keel, ocelli distinct, posterior side of ocellar triangle two-thirds as long as other two sides; antennae of moderate length, little thickened, segment 1 curved, a little thicker than 2, hardly shorter than 3, 2 nearly two-thirds as long as 3, nearly three times as long as broad, 3 four and a half times as long as broad. Pronotum smooth and shining, with no trace of a transverse impression, broader in front than behind, rather more than twice as long as broad behind; mesonotum a little longer than broad, weakly coriaceous; scutellum not defined but scutellar region transversely striate; meso-metapleural suture obsolete, but region of suture shallowly depressed, mesopleuron finely vertically striate, shining; metathorax + propodeum in dorsal view twice as long as broad, almost parallel-sided, in profile rising gradually to a point rather more than half-way along its length and then sinking gradually to orifice, rising rather higher than anterior margin of mesonotum, dorsal and posterior surfaces set at an angle of about 120°; dorsal surface shining, finely transversely striate in front, area between spiracles smooth, posterior surface regularly and closely transversely striate. Fore coxae twice as long as broad, fore trochanters about two-fifths as long as fore femora, little thickened distally, thin proximal stalk half as long as distal part and a little more than half as thick; fore femora thickened, but little clavate, *i.e.* distal stalk very short, one-fifth total length, thickest part of femora about twice as

[10] See p. 223.

thick as distal part of tibiae; fore tarsi with segments 1–4 together as long as tibiae, segments 1 and 4 very long, latter three-quarters as long as former, 3 produced into a slight proximal anterior (inner) hook; chelae as in fig. 4, enlarged claw with a subapical tooth and five rather small lamellae, which arise along the proximal three-quarters, tarsal segment 5 with a row of six rather narrow lamellae and two more set back from the row, a group of three lamellae at apex, and two rows of bristles alternating with the lamellae; hind femora moderately clavate, distal stalk a little longer than proximal club, which in dorsal view is three times as long as broad.

Type ♀, Surrey, Ripley (*J. O. Westwood*) (H.W.). A unique specimen.

Donisthorpina gen. n.

Female in most features similar to *Dicondylus* Curtis. Enlarged claw of fore tarsus with a subapical tooth and four moderately broad lamellae, fifth tarsal segment with two rows

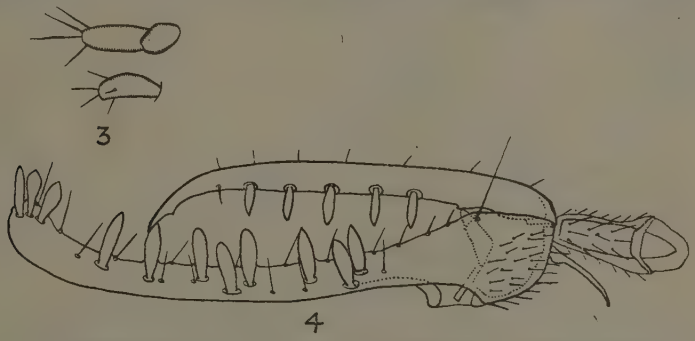


Fig. 3.—Maxillary and labial palps of *Monogonatopus oratorius* (Westw.) ♀.
Fig. 4.—Chela of same species ♀.

of lamellae (8 + 9) and a distal group (6). Maxillary palpi with five segments (first very small), labial palpi with two segments (fig. 5). Disc of pronotum divided from collar by a distinct transverse impression.

Male unknown.

Genotype: *D. formicicola* sp. n.

Donisthorpina formicicola sp. n.

Gonatopus oratorius Donisthorpe, 1927 : 384; 1927a : 104, *nec* Westwood, 1833a.

Testaceous; antennal segments 4–8, eyes, base of abdominal petiole, black or dark brown; legs yellowish testaceous. Insect almost entirely glabrous. Length 3·0 mm.

Vertex moderately excavated and moderately emarginate behind, shining (not alutaceous), with a strong central keel, ocelli vestigial, posterior side of ocellar triangle about half as long as the two other sides; antennae of moderate length, little thickened, segment 1 curved, a little thicker than 2, about as thick as 9, about as long as 4, 2 about as long as 6 (longer than 9), two and a half times as long as broad, 3 as long as 1 + 2, very nearly as long as 4 + 5, about six times as long as broad, 4–9 progressively shorter, 9 about one and a half times as long as broad, 10 as long as 5, nearly three times as long as broad. Pronotum with collar shining, hardly alutaceous, disc about one and a third times as long as broad, dull, very finely punctured; mesonotum a little longer than broad, very feebly longitudinally striate; scutellum feebly defined, smooth, twice as broad as long; a fine transverse keel a little behind scutellum may represent posterior edge of metanotum; meso-metapleural

suture almost effaced, mesopleuron finely vertically striate, shining; metathorax + propodeum in dorsal view not quite twice as long as broad, parallel-sided, in profile not rising quite as high as anterior edge of mesonotum, dorsal and posterior surfaces set at an angle of about 100°; dorsal surface shining, very finely striate, striae becoming stronger where they pass into posterior face, extending down to the latter a short way and then ending abruptly; below them are regular, strong, transverse striae which extend round to the sides. Fore coxae (fig. 6) almost two and a third times as long as broad, fore trochanters about one-third as long as fore femora, little thickened distally, thin proximal stalk about as long as distal part and more than half as thick; fore femora moderately clavate,

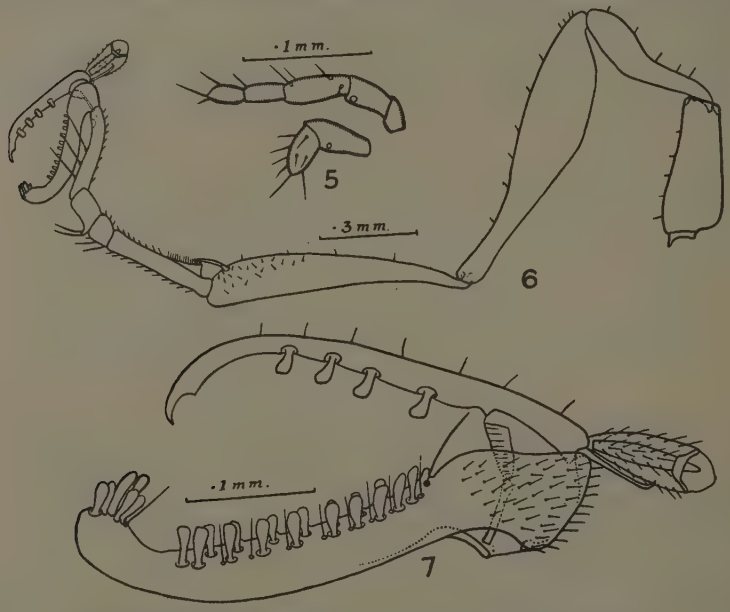


Fig. 5.—Maxillary and labial palps of *Donisthorpina formicicola* sp. n. ♀.
Fig. 6.—Fore leg of same species.
Fig. 7.—Chela of same species ♀.

distal stalk about one-third the total length, thickest part of femora about twice as thick as distal part of tibia; fore tarsi with segments 1–4 together three-quarters as long as tibia, segments 1 and 4 very long, subequal, 3 produced into a proximal anterior (inner) hook; chelea (fig. 7) with enlarged claw with a subapical tooth and four broad lamellae, which arise along the proximal two-thirds, tarsal segment 5 with two rows of broad lamellae (8 + 9), a distal group of six longer and narrower lamellae, and a row of bristles alternating with the lamellae; hind femora strongly clavate, distal stalk half as long again as proximal club, which in dorsal view is two and a half times as long as broad.

Type ♀, Hants South, New Forest, Matley Bog, in nest of *Formica picea* Nyl., 2.viii.1926 (*H. St. J. K. Donisthorpe*) (B.M.D.).

Gonatopus dichromus Kieffer, 1906, described from Corsica, may be an allied species. In it, however, the back of the head and abdomen are black and there is stated to be only eight lamellae on the fifth tarsal segment.

Dicondylus Curtis, 1829–30.

Female with enlarged claw bearing a subapical tooth and four or five rather narrow lamellae, tarsal segment 5 with seven or eight rather narrow lamellae in two rows and a distal group of three. Maxillary palpi with four segments, labial with two (fig. 8). Pronotum not crossed by a transverse furrow.

Male (see p. 226). Maxillary palpi with three or four segments, the fourth being short and more or less fused with the third, labial with two (fig. 38). Basal process of gonoforceps of genitalia (fig. 4) narrow, without membranous extensions.

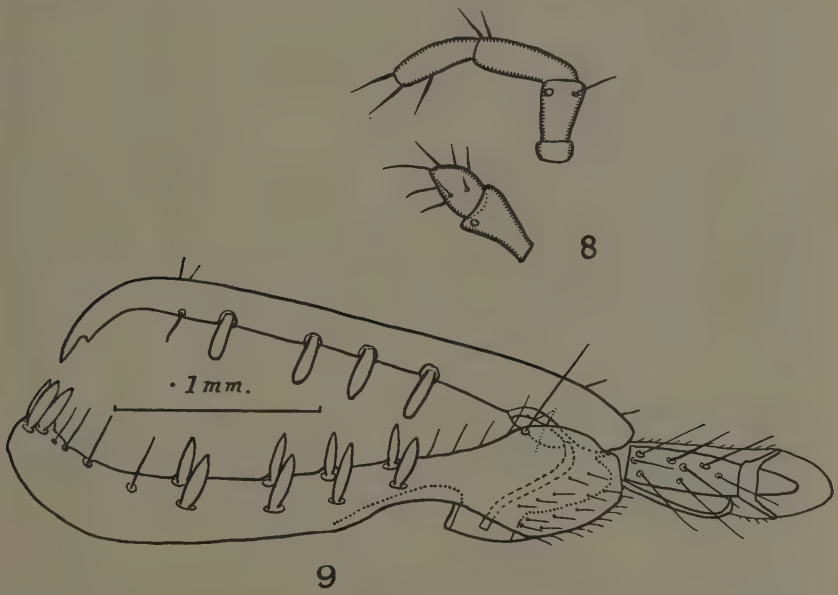


Fig. 8.—Maxillary and labial palpi of *Dicondylus bicolor* (Hal. *in* Curt.) ♀.
Fig. 9.—Chela of same species ♀.

Genotype: *Dryinus bicolor* Hal. *in* Curt., 1828. Only the type species is certainly referable to the genus.

Dicondylus bicolor (Haliday *in* Curtis, 1828).

Dryinus bicolor Haliday *in* Curtis, 1828.
Labeo vitripennis Haliday, 1833. **syn. n.**
Antaeon excisus Westwood, 1833a. **syn. n.**
Gonatopus decretorius Haupt, 1916. **syn. n.**

Black; mandibles, clypeus, lower orbits, antennal segments 1 and 2 (sometimes also narrow proximal part of 3), pronotum, disc of mesonotum and legs, light yellow. Anterior half of pronotum often black; pale markings of mesonotum vary in extent; usually club of fore femora and streak on posterior side of fore tibia sometimes black. Gula area more or less pale, especially in front. Insect almost completely glabrous. Length 2·75 mm.

Vertex deeply excavated and strongly emarginate behind, rather dull, finely alutaceous, with a weak central keel, ocelli distinct, posterior side of ocellar triangle almost half as long

as the other two sides; antennae rather short, moderately thickened, segment 1 curved, distinctly thicker than 2, as thick as 9, as long as 3, 2 not quite as long as 9, twice as long as broad, 3 about as long as 5 + 6 (shorter than 4 + 5), about five times as long as broad, 4–9 progressively shorter, 4 about two and two-thirds times, 9 one and a half times as long as broad, 10 as long as 8 + 9, more than three times as long as broad. Pronotum with at most a very faint trace of a transverse impression, smooth and shining, anterior margin weakly alutaceous, pronotum twice as long as posterior width; mesonotum quadrate, margined, with a feeble longitudinal keel, dull, alutaceous; scutellum well defined, shining, twice as broad as long; meso-metapleural suture obsolete, mesopleuron dull, alutaceous with weak vertical striae; metathorax + propodeum in dorsal view one and a half times as long as broad, almost parallel-sided, sides a little converging behind, in profile almost evenly rounded, rising a little higher than the anterior margin of the mesonotum, dorsal and posterior surfaces set at an angle of about 120°; dorsal surface usually dull (rarely shining), densely but rather weakly alutaceous, with irregular striae towards sides, more rarely distinctly striate right across, posterior surface and sides with rather more definite transverse striae. Fore coxae twice as long as broad; fore trochanters nearly half as long as femur, rather strongly thickened distally, proximal stalk two-thirds as long as distal part and half as thick; fore femora considerably thickened and clavate, distal stalk nearly one-third total length, thickest part of femora fully twice as thick as distal part of tibia; fore tarsi with segments 1–4 together a little longer than tibia, 1 a little longer than 4, 3 produced into a proximal anterior (inner) hook; chelae (fig. 9), enlarged claw with a subapical tooth and four or five rather narrow lamellae which arise along proximal two-thirds; tarsal segment 5 with a row of four and another of three or four lamellae, a group of three to five at apex, no bristles amongst the lamellae; hind femora strongly clavate, distal stalk as long as proximal club, which in dorsal view is three times as long as broad.

Specimens examined ♀♀: type[11] ♀ Kent West, Darenth Wood (*Haliday*) (D.); Suffolk East, near Ipswich, Bentley Wood, in cart rut 25.vii.1935 (M.); Cambs, Cambridge, in house, 4.viii.1921 (*F. Jenkinson*) (Ca.); Bottisham, 12.x.1890 (*D. Sharp*) (Ca.); Bucks, Burnham Beeches, bred nymph *Dicranotropis hamata* (Boh.), coll. 25.iii., em. 27.vi.1935 (*A. I. Hassan*), Slough, bred nymph *Dicranotropis hamata* (Boh.), coll. 13.vi., em. 3.vii.1935 (*A. I. Hassan*); Herts, Felden, 9.viii.1903 (*Piffard*) (M.), Harpenden, bred nymph *Cryomorphus albomarginatus* Curt. 12.vii.1938 (B. S. Williams) (Bl.); near London (B.M.); London, Hampstead Heath (*F. Smith*) (B.M.); Sussex East, Battle, viii.1881 (*E. A. Butler*) (M.); Berks, Virginia Water, bred nymph *Cryomorphus pteridis* (Boh.) coll. 12.vi., em. 17.vii.1932 (*see* Richards, 1933); Hants South, Brockenhurst, 22–26.viii.1932 (*G. E. J. Nixon*), New Forest, 29.vii.1918, swept up with ♀♀ of *Myrmica ruginodis* Nyl. (*H. St. J. K. Donisthorpe*) (B.M.D.) (*see* Donisthorpe, 1927a : 103); Dorset, Studland, 2 ex. marram dunes, 27.vii.1938 (O.W.R.); Scotland, Dumfries, Gretna, 16.vii.1937 (*Jas. Murray*); Ireland, Louth, Termonfeckin, cocoon on grass 9.vii., em. about 15.vii.1933 (*A.W.S.*).

I have also examined a female determined by Herr Dr. H. Haupt as *Gonatopus decretorius* Haupt, 1916—Germany, Sweinmünde, *ex. Delphacodes excisus* (Mel.), 26.viii.1916. It belongs to the form A below.

What are probably males of this species are described on p. 226. If the identifications are correct, that sex has been found in the following additional vice-county: Devon South.

[11] It is not clear whether the specimen in Haliday's collection previously reported on (Richards, 1933 : 51; Richards, 1935 : 147) is the type or whether the real type may not be in Curtis' collection at Melbourne. In any case, I think, there is no question as to the correct interpretation of his species.

There appear to be two forms of the female differing slightly in colour :—

A. Pronotum entirely yellow; mesonotum ventrally black, often largely black except for a small dorsal area which may become very reduced.

B. Pronotum with anterior half and posterior margin black; mesonotum entirely or almost entirely yellow, both above and beneath.

Of the sixteen females examined, thirteen are var. A. and five (including the type) of var. B. The amount of pale pigment in the antennae also varies; segment 3 may be half pale to entirely black, while segments 9 and 10 vary from more or less pale to black.

In a previous paper (Richards, 1933), I recorded breeding a female of *D. bicolor* (Hal. *in* Curt.) from a nymph of *Cryomorphus pteridis* (Boh.) at Virginia Water, Berks. The nymph was captured on 12.vi. and emerged and pupated on 16.vi. The adult female emerged on 17.vii.1932. The cocoon is a flattened, ovoid structure of coarse silk which may include particles of the substratum. Mr. Stelfox (see above) found one such cocoon on a grass-stem in Ireland. Maneval (1935) bred two female *D. bicolor* from nymphs of *Delphacodes collina* (Boh.) collected on 19.v. and 15.vi. He gives an account of the emergence of the larva. Dr. A. I. Hassan bred two females (see above) and one male (see p. 226) from nymphs of *Dicranotropis hamata* (Boh.). One nymph was collected at Burnham Beeches, Bucks, 25.iii.1935 and it moulted in 16.iv. when the sac first became visible. The *Dicondylus* emerged and spun its cocoon on 3.v. but it did not turn into a pupa until 29.v. A male emerged on 23.vi.1935 and died the same day.

A second nymph, also collected at Burnham Beeches on 25.iii., showed the sac on 22.iv. The larva emerged on 3.vi. and the female emerged on 27.vi., dying the next day.

A third nymph collected at Slough, Bucks, 13.vi.1935 had the sac already visible. The larva emerged and spun on 17.vi. and the adult female emerged on 13.vii., dying the next day.

Pseudogonatopus Perkins, 1905.

Female resembles *Dicondylus* Curtis in most characters but the pronotum is crossed by a distinct transverse impression, the enlarged claw of the fore tarsi has six to twelve broad lamellae, the fifth tarsal segment with two [12] rows of eight or more broad lamellae and a more or less large distal group of narrow ones. Palpi shown in fig. 10.

Male. Not known in European species.

Genotype *P. dichromus* Perkins, 1905. The range of the genus includes U.S.A., Japan, India, Australia, Fiji and Hawaii.

Pseudogonatopus distinctus (Kieffer, 1906).

Gonatopus distinctus Kieffer, 1906.
? *G. septemdentatus* Sahlberg, 1910.

Black, mandibles, clypeus, front part of vertex (more along orbits), antennal segments 1–2 and proximal half of 3, yellow; posterior part of occiput and legs reddish testaceous, ventral side of club of fore femora and base of hind coxae more or less blackened. Head, thorax, propodeum and legs with very short and sparse pale hairs. Length 3·5–4·0 mm.

Vertex moderately excavated, deeply emarginate behind, dull, alutaceous to finely rugose, central keel weak, ocelli very small, posterior side of ocellar triangle two-thirds as

[12] In the genotype, only a single row of eight is figured, but the second row is very difficult to make out if a balsam mount is not made.

long as the other two sides; antennae rather long, distinctly thickened distally; segment 1 curved, half as thick again as 2, as thick as 5 and as long as 4, much shorter than 5, as long as 9, two and a half times as long as broad, 3 as long as 1 + 2, very little shorter than 4 + 5, six times as long as broad, 4–9 progressively shorter, 4 four times, 9 one and a half times as long as broad, 10 as long as 4, three times as long as broad. Pronotum with a very strong transverse impression, collar dull, alutaceous, disc about one and a half times as long as broad, shining behind, dull and alutaceous in front, usually also with scattered feeble punctures; sides of pronotum just above fore coxae with four or five longitudinal striae; mesonotum about as long as broad, dull and alutaceous, almost no traces of striae; scutellum well defined, shining, with a few feeble punctures, less than twice as broad as long;

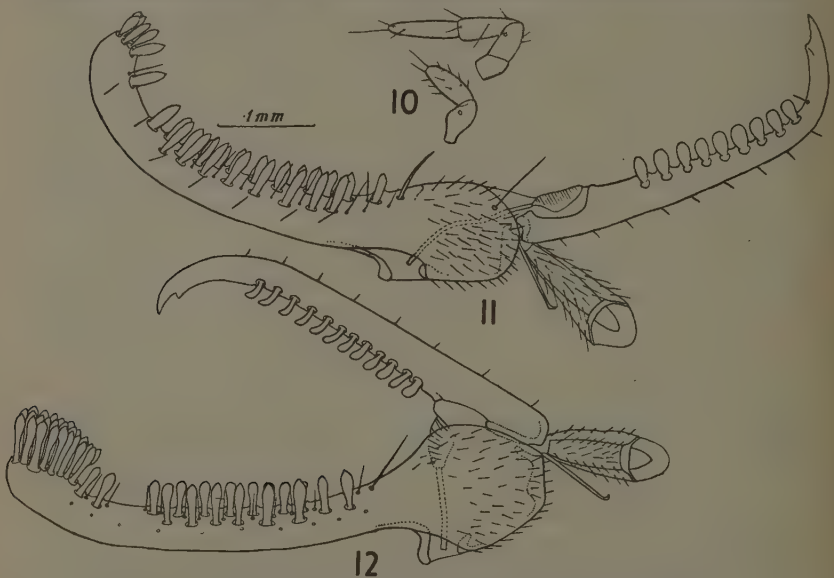


Fig. 10.—Maxillary and labial palpi of *Pseudogonatopus distinctus* (Kieff.) ♀.
Fig. 11.—Chela of same species ♀.
Fig. 12.—Chela of *P. separatus* sp. n. ♀.

metanotum perhaps recognisable in depression behind scutellum; meso-metapleural suture rather strong, especially below, mesopleuron dull, granulate with irregular striae; metathorax + propodeum in dorsal view one and two-thirds times as long as broad, parallel-sided but converging somewhat posteriorly, in profile somewhat flattened, not rising as high as anterior margin of mesonotum, dorsal and posterior surfaces set at an angle of about 120°; dorsal surface moderately shining, feebly and irregularly rugose and striate, posterior surface regularly and rather strongly transversely striate, sides rather more finely striate. Fore coxae two and a half times as long as broad; fore trochanters half as long as femora, distinctly clavate, this proximal stalk as long as distal part and less than half as thick; fore femora clavate, distal stalk nearly one-third total length, thickest part of femora fully twice as thick as distal part of femora; fore tarsi with segments 1–4 not quite as long as tibia, segments 1 and 4 very long, 4 three-quarters as long as 1, 3 produced into a very strong proximal anterior (inner) hook; chelae (fig. 11), enlarged claw with a subapical tooth and nine broad lamellae which arise along the central two-thirds; tarsal segment 5

with two rows (13 + 8) of moderately broad lamellae, a group of 5–7 at apex, and a row of bristles alternating with the lamellae; hind femora strongly clavate, distal stalk one-third as long again as proximal club, which in dorsal view is about three times as long as broad.

Specimens examined ♀♀: Surrey, Oxshott, 13.vi. (*A. Beaumont*) (M.) (claw with 7 lamellae); Wisley, 9.vii.1938 (*K. Guichard*) (claw with 9 lamellae); Berks, Windsor Forest, 7.vii.1934 (*H. St. J. K. Donisthorpe*) (B.M.) (claw with 9 lamellae); Hants South, New Forest, 8.vi.1908, swept up with *Formica fusca* L. var. *glebaria* Nyl. (*H. St. J. K. Donisthorpe*) (*see* Donisthorpe, 1927a : 103) (B.M.D.) (claw with 8 lamellae left, 6 (? 7) right, striae on sides of pronotum obsolete, disc of mesonotum a little pale, dorsal part of propodeum more shining); New Forest, 18.vi.1909, swept up with *Myrmica laevinodis* Nyl. (*H. St. J. K. Donisthorpe*) (*see* Donisthorpe, 1927a : 103) (B.M.D.) (claw with 8 lamellae); New Forest, Matley sand pit, 7.vii.1930 (M.) (claw with 8 lamellae, dorsum of propodeum with a faint longitudinal impression); New Forest, Brockenhurst, 7.vii.1909 (M.) (disc of mesonotum reddish); New Forest, Matley Bog, 9.vi.1911 (M.) (claw with 8 lamellae); Dorset, Studland, marram dunes, 14.vii.1938 (*O.W.R.*), Glanvilles Wootton (probably) (*H.D.*) (claw with 8 lamellae).

The specimens swept up with ants by Donisthorpe were identified by Kieffer; the species also agrees with the original description (1906 : 509). The type, which is stated to be in the Marshall collection, is probably lost.

Pseudogonatopus separatus sp. n.

Black, mandibles, clypeus, front part of vertex (more along orbits), antennal segments 1–2, 10 and proximal part of 3, yellow; posterior part of occiput, mesonotum above and below except a small anterior black mark, parts adjacent to orifice of propodeum, legs (except club of fore femora, narrow proximal part of mid and hind coxae, some of ventral side of club of mid and hind femora, which are black) reddish. Head, thorax, propodeum and legs with very sparse, short hairs. Length 3·0–3·5 mm.

Very close to *P. distinctus* (Kieff.) but differing as follows: Antennae less thickened, segment 1 thicker than 5 (at least as thick as 9), longer than 4 (about as long as 8 + 9), 2 nearly as long as 5, 4 three times, 9 rather more than one and a half times as long as broad. Pronotum in front with disc sinking less abruptly on to collar, which is shining with a small alutaceous area on each side, disc relatively a little longer; mesopleuron shining, almost smooth, with no striae; metathorax + propodeum with dorsal surface mostly smooth and shining. Fore tarsi with segment 4 as long or rather longer than segment 1, chelae (fig. 12) enlarged claw with 10–12 broad lamellae which arise along its proximal three-quarters; tarsal segment 5 with two rows (8 + 8) of moderately broad lamellae, a distal group of about twenty-five long narrow lamellae, and a row of bristles alternating with the lamellae.

Type ♀, Glamorgan, Porthcawl, 3.vii.1927 (*H. M. Hallett*) (B.M.) (claw with 10 lamellae). Paratypes: 3 ♀♀, Cornwall East, St. Merryn, vii.1925 (*K. G. Blair*) (claws with 11, 12, and 13 lamellae) (2 now in B.M.).

The present species, unlike the preceding, appears to be confined to sand-hills and, so far, is entirely western.

Plectrogonatopus gen. n.

Female in most features similar to *Dicondylus* Curtis. Enlarged claw with a preapical tooth and five or six inconspicuous, peg-like " lamellae," tarsal segment 5 with two or three rows of long, narrow lamellae (30–40 in all) and a group of 20–30 at apex. Maxillary palpi with four segments, first segment more distinct than in its allies, labial palpi with three

segments (figs. 13–16). Disc of pronotum divided from the collar by a distinct transverse impression.

Male. Not certainly known (cf. p. 224).

Genotype *Gonatopus striatus* Kieffer, 1905.

Plectrogonatopus striatus (Kieffer).

Gonatopus striatus Kieffer, 1905.
Dicondylus striatus Kieffer, 1914.

Black, mandibles, clypeus, front part of vertex (more along eyes than on disc), back of occiput indeterminately, antennal segments 1–2 and proximal half of 3, and legs testaceous; fore femora with a slight proximal posterior dark mark, hind coxae somewhat darkened

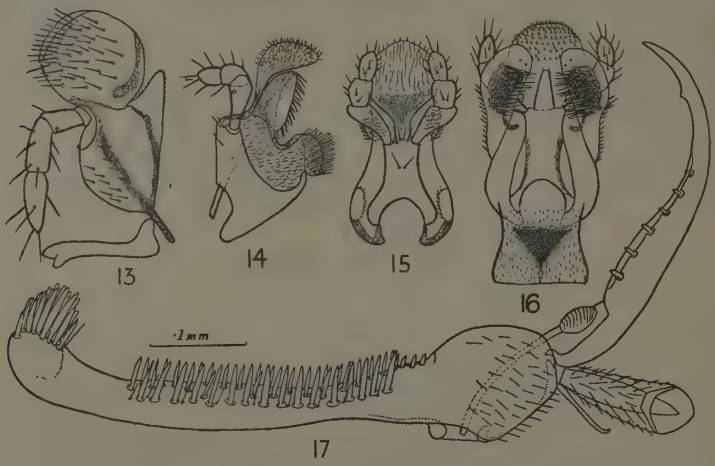


Fig. 13.—Ventral view of right maxilla of *Plectrogonatopus striatus* (Kieff.) ♀.
Fig. 14.—Labium of same species, from left side ♀.
Fig. 15.—Ventral view of labium of same species ♀.
Fig. 16.—Dorsal view of labium and anterior part of floor of pharynx of same species ♀.
Fig. 17.—Chela of same species ♀.

proximally. Head, thorax, propodeum and legs with sparse, short, white pubescence. Length 4·0 mm.

Vertex little excavated, moderately emarginate behind, dull with some more shining areas, alutaceous to weakly wrinkled, central keel usually rather weak, ocelli distinct, posterior side of ocellar triangle half as long as the two other sides; antennae short, distinctly thickened, segment 1 rather strongly curved, nearly twice as thick as 2, about as thick as 6 and as long as 8 + 9 (longer than 4), 2 as long as 4, two and a half times as long as broad, 3 not quite as long as 1 + 2, about as long as 4 + 5, about five times as long as broad, 4–9 progressively shorter, 4 about two and a half times as long as broad, 9 hardly more than quadrate, 10 twice as long as broad, as long as 5. Pronotum with collar shining with a small alutaceous patch on each side of centre, disc shining, almost unsculptured but more or less alutaceous in front, one and a half times as long as broad, sides of pronotum posteriorly with four or five horizontal striae; mesonotum quadrate with a few longitudinal striae; scutellum well defined, smooth, twice as broad as long; meso-metapleural

suture distinct, mesopleuron with rather strong vertical striae, shining; metathorax + propodeum in dorsal view one and a half times as long as broad, sides converging more in front than behind, but nearly straight, in profile rising evenly to a point a little before its middle, then sinking symmetrically to orifice, rising distinctly higher than posterior margin of mesonotum, anterior and posterior surface set at an angle of 100°; dorsal surface shining, sometimes finely alutaceous in part, anterior part almost unsculptured except for very short longitudinal striae from scutellum, posterior surface and sides regularly and rather strongly striate. Fore coxae thick, less than twice as long as broad, fore trochanters two-fifths as long as fore femora, rather strongly thickened distally, thin proximal stalk as long and half as thick as distal part; fore femora strongly thickened but hardly clavate, this distal part hardly one-fifth total length, thickest part of femora rather more than twice as thick as distal part of tibia; fore tarsi with segments 1–4 together as long as tibia, segments 1 and 4 long, 4 a little longer than 1, 3 produced into a strong proximal anterior (inner) hook; chelae (fig. 17), enlarged claw with a preapical tooth and five or six peg-like structures (not real lamellae) arising along proximal two-thirds (easily overlooked if a balsam mount is not made); tarsal segment 5 with two or three rows of long narrow lamellae (30–40), a group of 20–30 at apex, and at least one row of bristles amongst the lamellae; hind femora strongly clavate, distal stalk half as long again as proximal club, which in dorsal view is twice as long as broad.

Specimens examined ♀♀: Suffolk West, Brandon, Palmers Heath, 27.v.1929, in rabbit-hole with *Lasius niger* (L.) (M.); Suffolk East, Icklingham, 6.vi.1916, with ants (M.) (as *G. pilosus* Morley, 1917); Oxon, Shotover, 6.vii.1908 (H.); Kent East, Deal, 12.vii.1912, with *Lasius flavus* (Fab.) (*H. St. J. K. Donisthorpe*) (*see* Donisthorpe, 1927a : 103) (B.M.D.); Hants South, New Forest, Matley sand pit, 5.vi.1936, with *Lasius niger* (L.) (M.); Devon South, Branscombe, iv.1935 (Bl.); Devon North, Croyde, iv.1928 (Bl.); Ireland, Wexford, Kilgorman, 14.vii.1927, Curracloe, 17.vii.1937, and Ballyteige, 28.vi.1922 (*A.W.S.*); no locality, 3 ex. (Haliday coll.) (D.). I have also seen a specimen from Jersey (B.M.) which is the one referred to by Walker as *Dicondylus pedestris* (*see* Richards, 1935 : 147).

The type (described from Trieste by Kieffer, 1905 : 92) should be in coll. Graeffe at Vienna. The preceding specimens agree well with the original description, except that they have 5–6 lamellae on the claw, not 6–8.

Gonatopus Ljungh, 1810.

Digonatopus Kieffer, 1913.

Female. Enlarged claw of fore tarsus without lamellae, preapical tooth vestigial, fifth tarsal segment with its inner edge straight, bearing a long row of very small lamellae and a small distal group of five to seven. Maxillary palpi with five segments, the proximal one very small, labial with two (fig. 18). Pronotum crossed by a transverse impression.

Male not certainly known.[13]

Genotype *Gonatopus formicarius* Ljungh, 1810.

Synonym. *Digonatopus* Kieffer, 1913. Type = *G. australiae* Perkins, 1905. **syn. n.**

[13] Various males have been bred and ascribed to *Gonatopus* in U.S.A. and Australia, but no male is known which is clearly conspecific with any of three European species I have studied. Only the females described below can be referred to the genus with certainty, though so-called "*Gonatopus*" are recorded from all over the world.

Gonatopus sepsoides Westwood, 1833a.

G. pedestris of British Authors, in part.
G. pilosus Thomson, 1860. **syn. n.**
G. sociabilis Kieffer, 1907. **syn. n.**
? *G. borealis* Sahlberg, 1910.

Black, mandibles, clypeus, front part of vertex (more along orbits) lower part of occiput and most of ventral side of head, antennal segments 1–2 (sometimes also narrow proximal part of 3), a more or less extensive patch on first abdominal tergite posteriorly, and legs (except most of club of fore femora, sometimes underside of club of mid femora, and small

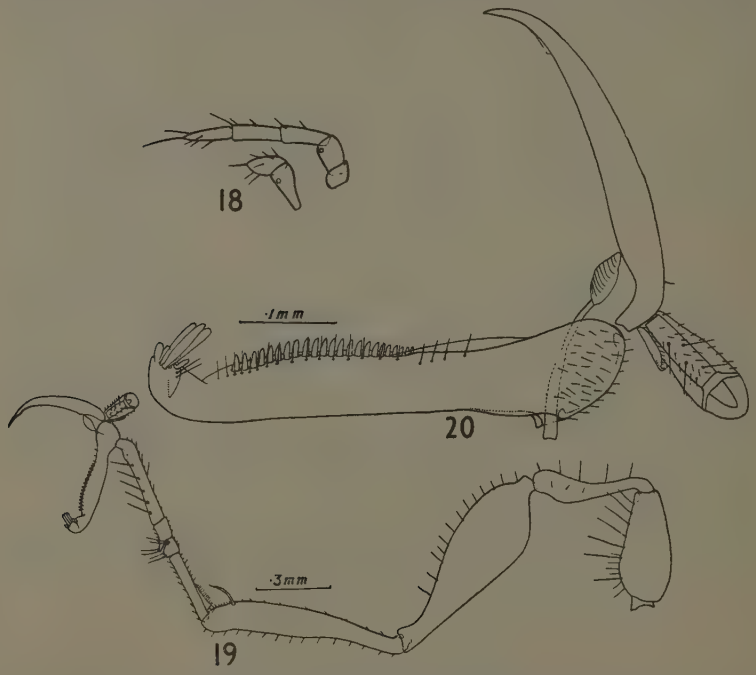


Fig. 18.—Maxillary and labial palps of *Gonatopus sepsoides* Westw. ♀.
Fig. 19.—Fore leg of *G. barbatellus* sp. n. ♀.
Fig. 20.—Chela of same species ♀.

distal extremity of hind femora and mid tibiae), reddish-yellow. Head, pronotum and legs with fairly numerous, short, pale hairs; fore coxae, mesonotum and propodeum with long pale hairs, and ventral side of thorax with similar hairs, which, though numerous, are nowhere really dense (rather more numerous on sternum opposite scutellum). Abdomen with very feeble, sparse hairs. Length 2·5–3·75 mm.

Vertex moderately excavated (amount rather variable) and rather strongly emarginate behind, moderately shining, disc and orbits alutaceous but more shining on each side of disc, central keel distinct, ocelli distinct, posterior side of ocellar triangle about half as long as the two other sides; antennae of moderate length and moderately thickened distally; segment 1 nearly twice as thick as 2, as thick as 9, a very little longer than 4, 2 about as long

as 5, three times as long as broad, 3 not quite as long as 1 + 2, as long as 4 + 5, six times as long as broad, 4–9 progressively shorter, 4 three and a half times, 9 one and a half times as long as broad, 10 two and a half times as long as broad, as long as 4. Pronotum with collar moderately shining, lateral part entirely alutaceous, a more or less large central area smooth and shining, transverse impression very strong, disc one and a half times as long as broad, surface rather dull, alutaceous, with a variable posterior area smooth, sides just above fore coxae with a few longitudinal striae; mesonotum a little longer than broad, rather dull to moderately shining with more or less distinct longitudinal striae; scutellum rather well defined, moderately shining, often finely alutaceous, less than twice as long as broad; a distinct impression just behind the scutellum may represent the metanotum; meso-metapleural suture quite distinct, lying in a shallow, rather broad depression, mesopleuron dull, densely alutaceous with more or less distinct traces of striae; metathorax + propodeum in dorsal view about twice as long as broad, almost parallel-sided, in profile rounded, rising to about the same height as the anterior margin of the mesonotum, dorsal and posterior faces set at an angle of about 120°; dorsal surface shining, mostly smooth but with some irregular rugosities and punctures, posterior surface with strong transverse striae, which die out on the sides which are dull and alutaceous. Fore coxae fully twice as long as broad; fore trochanter more than half as long as fore femora, moderately thickened distally, thin proximal stalk about as long as or rather longer than the distal part and more than half as thick; fore femora distinctly clavate, distal stalk about one-quarter the total length; thickest part of femora more than twice as thick as distal part of tibia; fore tarsi with segments 1–4 together three-quarters as long as tibia, segments 1 and 4 very long, subequal, 3 produced into a large proximal anterior (inner) hook; chelae as in *G. barbatellus* sp. n. (figs. 19–20), enlarged claw with a vestigial preapical tooth, no lamellae, and only one or two small bristles on proximal part of inner side; tarsal segment 5 with inner edge nearly straight with a row of 17–19 small, close-set lamellae, a group of 5–9 longer lamellae at apex, and a row of 14–21 bristles behind the lamellae; hind femora strongly clavate, distal stalk rather more than half as long again as proximal club, which, in dorsal view, is two and a half times as long as broad.

Specimens examined ♀♀: type[14] (no locality label) Hope–Westwood collection (H.W.); paratype, Isle of Wight, Blackgang Chine (*Westwood*) (H.W.); Cumberland, Cleator, 3.vii.1917 (*J. Murray*); Cheshire, Hollingsworth, vi.1917 (*W. Potter*) (*Dicondylus pedestris* of Hardy, 1917); E. Norfolk, Palling, sandhills 8.viii.1934 (M.), 2 ex. Waxham, 16.vi.1937 (*K. Guichard*), Burnham Dunes, 2.vii.1937 (*P. Freeman*); E. Suffolk, Lowestoft, 1.viii.1855 (*F. Smith*) (B.M.), 2 ex. Lowestoft Denes, 13. and 28.viii.1908 (M.); Hereford, Ross-on-Wye, 25.vii.1935 (*H. M. Hallett*); Bucks, Slough, 2 ex. 1.vi.1935, 2 ex. 11.viii. 1938 (*O.W.R.*) (see p. 212); Herts, Felden (*A. Piffard*) (M.); London, Barnes, 18.vii.1842 " running on a sandy, grassy place " (*Westwood*) (H.W.), Dulwich, vi. (*Westwood*) (H.W.), near London (B.M.); Kent East, Deal (*F. Smith*) (B.M.), Deal sandhills, vi.1908 (*Donisthorpe*) (M.); Surrey, Oxshott, 12.viii.1920 (H.), Wimbledon Common, 23.vi.1935 and 23.viii.1936, Richmond Park, bred nymph *Deltocephalus* sp., coll. 21.vii., em. 5.ix.1935 (*O.W.R.*); Sussex East, Camber, 26.viii.1902, running with workers of *Tetramorium caespitum* (L.) (B.M.D.) (type of *Gonatopus sociabilis* Kieffer, *see* Donisthorpe, 1927a : 103); Berks, Cumnor, 6.ix.1923, running with workers of *Lasius niger* (L.) (B.M.D.) (*see* Donisthorpe, 1927a : 103, where the specimen is referred to under *Gonatopus distinguendus*); Hants South, Lymington, 15.viii.1901 (M.), New Forest, Mark

[14] The real type, the Blackgang Chine specimen, is headless and without any fore legs, but from the sculpture of the thorax it is almost certainly conspecific with the other Westwood specimen which I am treating as type—*see* Richards 1935 : 146.

Ash, 26.vi., 11.vii., 15.vii.1930 (M.); Dorset, Studland Heath, on marram dunes, 11., 12., and 27.vii.1938 (*O.W.R.*), 19.ix.1935 (*C. Diver*), nr. Wareham, 6.vi.1938 (*P. Freeman*), 2 ex. probably Glanvilles Wootton (H.D.); Devon North, Croyde, 2 ex. vi.–vii.1927 (Bl.); Cornwall East, St. Merryn, vii.1925 (Bl.); Pembroke, Milford Haven (*T. A. Marshall*) (F.), Freshwater West, sandhills, 31.viii.1938 (*H. W. Daltry*); Ireland, Dublin, 3 Donabate sandhills, 25.viii.1935 (*J. F. Perkins*) (B.M.), Portvane, 30.viii.1931 (*A.W.S.*), N. Bull, 24.ix.1930 (*E. O'Mahoney*) (D.); Wicklow, The Murrough, 1.viii.1926 (*A.W.S.*); Mayo, Clare Is., vi.1911 (*W. F. Johnson*) (M.); Kerry South, Gap of Dunloe, 22.vi.1929 (*E. F. Bullock*) (D.); no locality data (*F. Smith*) (H.W.), 2 ex. (H.W.) (*F. Smith*) (B.M.), 2 ex. (Stephens coll.) (B.M.), 2 ex.(F.), 1 ex.(*Desvignes*) (B.M.), 1 ex. (M.), 2 ex. (Haliday coll.) (D.).

I have also examined: Germany, Berlin, ♀ (Erichson) (Zool. Institut d. Univ., Berlin); Austria, Wien, Türkenschanze, ♀, 27.vii. (*Giraud*) (P.) (det. as *G. formicarius* Ljungh).

In an earlier paper (1935 : 146), I redescribed the type of *G. sepsoides* and stated that *G. sociabilis* was distinct. At that time I thought it was possible to describe the chelae without making balsam mounts. I now find that this is not so; moreover, the chelae of the type are somewhat damaged. Nevertheless, in the mount I have now made it can clearly be seen that there are fifteen or rather more lamellae (not none as I stated in 1935). The other characters I mentioned in 1935 as differentiating *G. sociabilis* are variable and it is clear that the species is a synonym of *G. sepsoides*. Mr. J. F. Perkins kindly examined the type of *G. pilosus* Thomson, 1860, at Stockholm and reports that it is the same as *G. sepsoides*. The five chelae which I have mounted in this species had the following numbers of lamellae and bristles :—

	Lamellae in main row	Bristles in main row	Distal group of lamellae
Wimbledon, 25.vi.1935 .	19	15	8
Richmond Park, 5.ix.1935	19	21	9
Type *G. sociabilis* . .	17	17	7
Type *G. sepsoides* . .	15 +	14	5 +
No data (M.) . . .	15	16	11

G. sepsoides Westw. is considerably the most common British Gonatopodine. The adults are found not uncommonly on light or sandy soils during the summer. In such situations, ants, such as *Lasius niger* (L.), are usually common; *G. sepsoides* certainly resembles them rather closely at first sight, but it has a more jerky way of walking and the presence of the chelae makes the fore feet move in a peculiar way. Mik (1882) bred an insect which was identified by Mayr as *G. pilosus* Thoms., and was probably the present species, from nymphs of *Deltocephalus xanthoneurus* Fieb.; they were collected in September and emerged from the cocoon in the following year.

At Slough, Bucks, in June 1935 I gave an adult female to Dr. A. I. Hassan; it laid an egg in a Jassid nymph on 3.vi. The larval sac protruded on 20.vi. The *Gonatopus* larva moulted on 23.vi. and 26.vi. and emerged on 28.vi. It died without spinning a cocoon.

An adult female of *Deltocephalus pascuellus* Fall. with a sac was found at Slough, Bucks, 2.vii.1938. The *Gonatopus* larva emerged on 3–4.vii. and the adult female on 11.viii.1938.

An adult female of *Deltocephalus striatus* (L.) with a sac was found in Richmond Park, Surrey, on 21.vii.1935. The larva emerged and spun on 26.vii. and the adult female emerged on 5.ix.1935. She was at once put in a tube with damp sand, and some grass and six nymphs of *Deltocephalus pascuellus* Fall. were added. She immediately dashed at one and stung it repeatedly and began licking the left pleuron beneath the wings. She went on stinging at intervals, possibly partly using the sting to press the hopper into her mouth from the other side. She fed thus for three minutes. She now attacked a second nymph in the same way but did not lick it so much. She held it for two minutes. Both hoppers looked dead at first but recovered and crawled back on to the grass in ten minutes. The female just failed to catch a third hopper. By 9.ix. two of these hoppers were dead and the others had become adult. The female was seen to attack an adult. None of the specimens, however, showed a sac before they died. I suspect that this species reproduces parthenogenetically, at least to a large extent.

Gonatopus barbatellus sp. n.

Very close to *G. sepsoides* Westw.: Black of vertex extends further both forwards and backwards (only small central part of occiput pale); abdomen black; legs testaceous, club of fore femora darkened beneath; front margin of pronotum rather narrowly testaceous; mesonotum yellow both above and below. Pubescence longer and denser throughout, especially on the fore coxae and propodeum; moderately conspicuous even on abdomen. Length 3·0 mm.

Vertex rather less excavated, entirely dull and coarsely alutaceous, central keel nearly obsolete; pronotum duller, more uniformly alutaceous, sides with no striae; mesonotum dull, alutaceous, not striate; meso-metapleural suture very strong, raised, followed by a quite deep depression, mesopleuron alutaceous, almost without striae; metathorax + propodeum entirely dull and alutaceous, even on posterior surface striae weak and only distinct near orifice; fore trochanters (fig. 19) with stalk rather shorter than distal club and not half as thick; tarsal segment 5 (fig. 20) with a row of 23 small lamellae, a distal group of about 7, and 20 bristles.

Type ♀, no locality (H.W.). Paratype ♀, Suffolk East, Icklingham sandhills, 18.vi.1915 (M.).

This species differs especially from *G. sepsoides* in the blacker, much duller head, duller thorax, yellow mesonotum, much duller and less striate propodeum and strong pleural impression.

The type is labelled " *Dicondylus* coll. Smith 1879 "; it is almost certainly of British origin. The paratype differs a little from the type, as follows: front of pronotum only pale at sides, mesonotum blackened at front margin, tarsal segment 5 with 19 lamellae, 15 bristles and a distal group of 8 lamellae.

Gonatopus formicarius Ljungh, 1810.

Close to *G. sepsoides* Westw. but differs as follows: anterior margin of collar and most of disc of pronotum reddish; club of mid femora dark beneath, hind coxae mainly black. Hairs all very short and inconspicuous even on propodeum. Length 3·0 mm.

Vertex with ocelli in a nearly equilateral triangle; pronotum a little duller and more evenly alutaceous, sides with no striae; scutellum quadrate; whole thorax and propodeum, evenly and rather strongly alutaceous, with no traces of striae except a very few weak ones just above orifice; metathorax + propodeum in dorsal view with sides more rounded, in profile less raised (not rising so high as anterior margin of mesonotum); fore femora with

distal stalk rather longer; front tarsi with segment 5 bearing 19 small lamellae, a group of 8 lamellae and 4 bristles at apex, and a row of 16 bristles amongst the lamellae.

Besides one female without data (B.M.), but almost certainly European, I have examined the type ♀ kindly sent from Lund by Dr. N. A. Kemner. Further: Germany, ♀, Thuringia (*Schmiedeknecht*) (P.) (det. as *G. pedestris* Dalm.). The series standing under *G. formicarius* Ljungh in the Paris Museum consisted of a mixture of four species: *G. sepsoides* Westw., *Neogonatopus lunatus* (Klug) and two species unknown to me.

In Kieffer's key to *Gonatopus* it runs down to *G. glaber* Kieffer, 1905, but that species is said to have two rows of lamellae on the fifth segment of the fore tarsi. It is probably not the same as *G. formicarius* Kieffer, a species I cannot identify.

Differs from *G. barbatellus* sp. n. in the barer thorax, more shiny head, black mesonotum and less deep impression in region of meso-metapleural suture.

Neogonatopus Perkins, 1905.

Enlarged claw of fore tarsus without lamellae, but sometimes with four or five bristles, preapical tooth vestigial, tarsal segment 5 with inner edge often raised into a distinct prominence which bears the lamellae, apical part rather strongly curved, lamellae 12–21, distal group 5–12. Maxillary palpi with four segments (first very small), labial with two segments (fig. 22). Disc of pronotum divided from collar by a distinct transverse impression.

Male unknown.

Genotype: *N. ombrodes* Perkins, 1905. The genus is known from Europe and U.S.A.

Neogonatopus distinguendus (Kieffer).

Gonatopus distinguendus Kieffer, 1905.
? *G. leucostomus* Sahlberg, 1910.

Black; mandibles, clypeus, front part of vertex (especially along orbits), antennae 1–2 (rarely 1–9) yellow; back of occiput and underside of head partly red-tinged; antennae 3–10 lighter or darker yellow-brown; fore legs with coxae and tibiae testaceous, trochanters, stalk of femora and tarsi light yellow, club of femora dark brown to black; mid and hind legs with coxae proximally black, trochanters and distal end of coxae light yellow, femora testaceous, distal end and club beneath brown, part of stalk before brown end light yellow, tibiae and tarsi testaceous, distal end of former darker. Posterior part of head, thorax, propodeum, abdomen and legs with very short, sparse, white hairs. Length 3·25–3·75 mm.

Vertex strongly excavated and strongly emarginate behind, shining, a little alutaceous posteriorly, central keel distinct, ocelli much reduced, posterior side of ocellar triangle about half as long as the two other sides; antennae long and thin, very little thickened, segment 1 fully twice as thick as 2, thicker than any other segment, about as long as 6, 2 about as long as 8, three times as long as broad, 3 much longer than 1 + 2, as long as 4 + 5, very thin, eight to nine times as long as broad, 4–9 progressively shorter, 4 five times, 9 nearly two and a half times as long as broad, 10 as long as 5, three and a half times as long as broad. Pronotum moderately shining but evenly and finely alutaceous throughout, disc about one and two-thirds times as long as broad; mesonotum distinctly longer than broad, dull, alutaceous; scutellum not defined in front, only weakly so behind, no impression behind it; meso-metapleural suture obsolete, no general depression of surface along its course, mesopleuron dull, alutaceous with weak vertical striae; metathorax + propodeum in dorsal view (*i.e.* part behind scutellum) more than twice as long as broad, almost parallel-sided but somewhat

convergent behind, in profile rising a little above anterior margin of mesonotum (which is less raised than usual), long dorsal surface almost flat, making with posterior surface an angle of more than 120°; whole surface dull, regularly and finely alutaceous, with a few striae only towards lower part of posterior surface. Fore coxae more than twice as long as broad; fore trochanters rather less than half as long as femora, moderately thickened distally, thin proximal stalk about as long as distal part and half as thick; fore femora distinctly clavate, distal stalk hardly one-quarter the total length, thickest part of femora

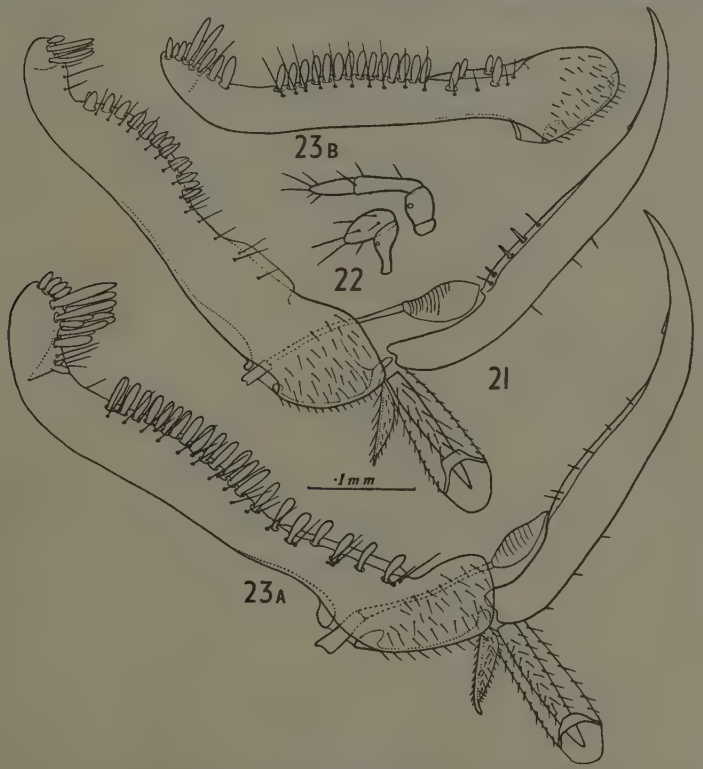


Fig. 21.—Chela of *Neogonatopus distinguendus* (Kieff.) ♀.
Fig. 22.—Maxillary and labial palpi of *N. lunatus* (Klug) ♀.
Fig. 23.—Chela of same species: (a) Deal specimen (H.W.), (b) Lozère specimen (O.W.R.) ♀.

more than twice as thick as distal end of tibia; fore tarsi with segments 1–4 about three-quarters as long as tibiae, segments 1 and 4 very long, subequal, 3 produced into a large proximal anterior (inner) hook; chelae (fig. 21), enlarged claw with a vestigial preapical tooth and four or five bristles on proximal half, tarsal segment 5 with a distinct prominence covering rather more than its central third (near to distal end), a main row of 10–14 small lamellae and a second one of about 3 lamellae further on inner surface, about 18 bristles mostly amongst the lamellae, at apex with about six long lamellae, one or two short ones and a few bristles; hind femora strongly clavate, distal stalk rather more than twice as long as proximal club which, in dorsal view, is twice as long as broad.

Specimens examined ♀♀: Norfolk East, Burnham Dunes, 1. and 2.vii.1937 (*P. Freeman*); Dorset, Chesil Beach, 5.vi.1875 (*J. W. Dale*) (H.D.), Studland, 11.vii.1938 (*O.W.R.*), ix.1935 (*C. Diver*); Glamorgan, Porthcawl, 24.vii.1915 (*H. M. Hallett*) (Cardiff Museum); Ireland, Wexford, Kilmore, 11.viii.1898 (*A. Beaumont*) (M.), Kilgorman, 28.vii.1927 (*A.W.S.*), Curracloe, 29.vi.1930, 16., 17., and 25.vii.1937 (*A.W.S.*) (in specimen 17.vii., whole thorax and propodeum less alutaceous and more shining than in others); no locality but British (*Paget*) (H.D.); Jersey, St. Ouen's Bay, sandhills, 22.vi.1935 (*R. B. Pike*); Corsica, 2 ex. (*T. A. Marshall*) (F.) (in one the prominence of tarsal segment 5 bears 13 + 5 lamellae).

This species agrees closely with the original description of *G. distinguendus* in Kieffer (1905 : 116) with the additions made by Kieffer (1906 : 508). The type which was in Marshall's collection is probably lost. The specimen from Porthcawl is unusual in having the antennae yellow except for the last segment. I have examined a specimen of *Allogonatopus procerus* Haupt, 1938; it is closely allied (the palpi were not dissected) but the head and pronotum are a little more shining, the metathorax + propodeum is a little shorter, the chela and the colour are different.

Neogonatopus lunatus (Klug).

Gonatopus lunatus Klug, 1810.
G. myrmecophilus Kieffer, 1905. **syn. n.**
? *G. marshalli* Kieffer, 1905.
? *G. marshalli* var. *neesi* Kieffer, 1905.

Black; mandibles, clypeus, front part of vertex, back of occiput, reddish-yellow; antennae 1–2, most of mesonotum above and beneath, pale yellow; most of pronotal collar, and front part of disc (sometimes whole pronotum) red-tinged; fore legs brown, base of coxa and whole trochanter testaceous, fore tibia yellow anteriorly, tarsi testaceous, segments 2–3 darker, claw paler; mid and hind legs testaceous, base of coxae, club and narrow distal part of femur and last tarsal segment brown, stalk of femur whitish; propodeum in the region of orifice testaceous; abdominal tergite 1 anteriorly pale-tinged. Body almost glabrous except small dense patches on anterior orbits, inner side of scape, and mesosternum which has rather numerous outstanding white hairs forming a dense, short tuft just in front of the mid coxae. Length 3·2–3·5 mm.

Vertex moderately excavated and strongly emarginate behind, shining, very weakly alutaceous, becoming more strongly so posteriorly, ocelli very much reduced, posterior side of ocellar triangle more than half as long as other two sides; antennae long and thin, very little thickened, segment 1 about twice as thick as 2, rather thicker than 9, as long as 5, segment 2 as long as 6, rather more than three times as broad, 3 shorter than 1 + 2 or 4 + 5, about as long as 6 + 7, six to seven times as long as broad, 4–9 progressively shorter, 4 five times, 9 one and two-thirds times as long as broad, 10 as long as 6, nearly three times as long as broad. Pronotum moderately shining, weakly alutaceous, more strongly so at sides, disc at least one and two-thirds times as long as broad; mesonotum nearly twice as long as broad, dull, alutaceous; scutellum not defined in front, strongly so behind, less than twice as broad as long, smooth and shining, impression behind it deep; meso-metapleural suture very weak, lying in a broad shallow depression, mesopleuron dull and alutaceous throughout, not striate; metathorax + propodeum (part behind postscutellar depression) in dorsal view elliptical, about twice as long as broad, in profile rising very strongly from postscutellar depression to a point high above anterior margin of mesonotum, descending in a nearly regular curve to the orifice, whole surface dull and alutaceous nowhere striate. Fore coxae two and a half times as long as broad; fore trochanters rather less than half as long as femora, strongly thickened distally, thin proximal stalk nearly as

long as distal part and less than half as thick; fore femora distinctly clavate, distal stalk about one-fifth total length, thickest part of femora two and a half times as thick as distal end of tibia; fore tarsi with segments 1–4 three-quarters as long as tibiae, segments 1 and 4 very long, 1 hardly the longer, 3 produced into a long proximal anterior (inner) hook; chelae (fig. 23), enlarged claw with a vestigial preapical tooth and six bristles which arise along proximal half, tarsal segment 5 with a weak prominence on its central half, a row of 12–21 long lamellae extending right to proximal end, about 16–23 bristles, half of them alternating with the lamellae, and distally with about 7 long and short lamellae and a few bristles; hind femora strongly clavate, distal stalk twice as long as proximal club which, in dorsal view, is two and half times as long as broad.

Specimens examined ♀♀: Norfolk East, Burnham sand dunes, 3 ex. 1–2.vii.1937 (*P. Freeman, D. A. Sturdy, H. B. N. Hynes*); Kent East, Deal, 2 ex. 21.vi.1908 running with *Lasius niger* (L.) (*Donisthorpe*) (1 B.M.D., 1 H.W.) (*see* Donisthorpe, 1927a : 104); Dorset, Studland, on marram dunes, 2 ex. on 14.vii., 19.vii., 27.vii.1938 (*O.W.R.*); Germany (probably), 19.vi.1856 (*Ruthe*) (B.M.); Germany, Berlin (*Klug*) (Zool. Institut d. Univ., Berlin) (type of *G. lunatus* Klug); France, Lozère, Ste. Enimie, 16.viii.1927, on sandy meadows at edge of river Tarn (*O.W.R.*); Austria, Wien, Türkenschanze, 27.vii. (*Giraud*) (P.) and no data (coll. Sichel) (P.) (det. as *G. formicarius* Ljungh). The type of *G. myrmecophilus* was found in Luxembourg in a nest of *Formica rufibarbis* Fab. by Wasmann (*see* Kieffer, 1906 : 113). Mr. Donisthorpe's specimens were determined by Kieffer at a later date; they agree fairly closely with the original description.

The type of *G. marshalli* Kieffer, 1905, should be in T. A. Marshall's collection which is lost. The description reads like that of a pale specimen of the present species.

G. neesi Kieffer was erected to replace *G. lunatus* Nees which he thought differed from *G. lunatus* Klug. The Nees types of DRYINIDAE are now lost and there seems to be no point in regarding *G. neesi* as a separate species.

Of the four specimens whose chelae have been mounted, the following numbers of lamellae were found (fig. 23, a & b) (apart from the distal group) :— type *lunatus* 12, Ste. Enimie 18, Ruthe coll. 20, Deal 21. Although the number of lamellae seems unusually variable, it does not seem to be associated with variation in any other character.

Tetrodontochelys gen. n.

Female in most features similar to *Gonatopus* Ljungh. Enlarged claw of fore tarsus with a vestigial preapical tooth and a few fine bristles, tarsal segment 5 with a slight prominence bearing four small lamellae and a group of 4–5 at apex. Maxillary and labial palpi both with two segments (fig. 24). Disc of pronotum almost completely fused with collar, transverse impression very weak.

Male unknown.

Genotype : *Gonatopus ljunghii* Westwood, 1833a.

Tetrodontochelys ljunghii (Westwood).

Gonatopus ljunghii Westwood, 1833a.

Black; mandibles, clypeus, minute frontal patch just above antennae, anterior orbits narrowly, reddish-yellow; antennae yellow-brown, darkening distally; legs testaceous, club of fore femora, posterior streak on fore tibiae, hind coxae, black; clubs of mid and hind

femora and distal end of hind tibiae brown. Surface almost entirely glabrous. Length 3·0 mm.

Vertex moderately excavated and moderately emarginate behind, shining, weakly alutaceous especially at sides posteriorly, central keel almost obsolete, ocelli distinct, posterior side of ocellar triangle a little longer than the other two sides; antennae of moderate length, little thickened, segment 1 more than twice as thick as 2, thicker than any other segment, almost as long as 5, hardly more than twice as long as broad, 3 a little longer than 1 + 2, about as long as 4 + 5, very thin, eight to nine times as long as broad, 4–9 progressively shorter, 4 five times, 9 one and a half times as long as broad, 10 nearly as long as 4, three times as long as broad. Pronotum strongly shining, only a longitudinal strip on

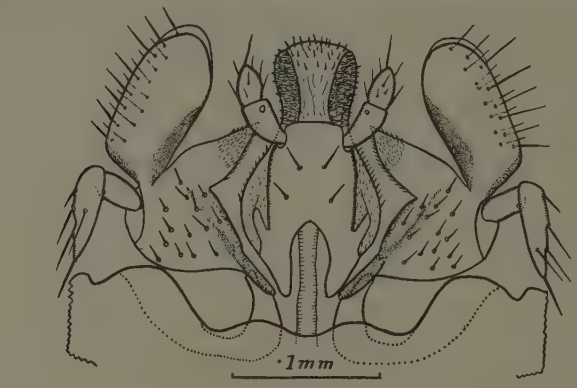


Fig. 24.—Ventral view of maxillae and labium of *Tetrodontochelys ljunghii* (Westw.) ♀.
Fig. 25.—Chela (claw and empodium omitted) of same species ♀.

each side of middle alutaceous, transverse impression almost obsolete but traceable in mid-dorsal region, in profile pronotum almost regularly though weakly convex from one end to other; mesonotum as long as broad, dull, coarsely alutaceous; scutellum weakly defined, about twice as broad as long, weakly and irregularly rugose, postscutellar depression weak; meso-metapleural suture weak, lying in a feeble depression of general surface of pleuron, mesopleuron dull, alutaceous, with a few weak striae above mid coxae; metathorax + propodeum (*i.e.* part behind scutellum) not quite twice as long as broad, almost parallel-sided but sides bulging outwards somewhat and then converging posteriorly, in profile not rising nearly as high as anterior margin of mesonotum, dorsal surface almost flat, set at an angle of 120° with posterior surface; whole surface dull and alutaceous, with some irregular rugosities just behind scutellum and a few weak transverse striae just above orifice. Fore coxae twice as long as broad; fore trochanters distinctly less than half as long as fore femora, rather strongly thickened, but thicker in centre than distally, proximal stalk not

clearly marked off, much shorter than thickened part; fore femora strongly thickened but hardly clavate, the thin distal part being very short, thickest part of femora two and a half times as thick as distal end of tibia; fore tarsi with segments 1–4 together almost as long as tibia, 1 and 4 very long, 1 distinctly the longer, 3 produced into a small proximal anterior (inner) hook; chelae (fig. 25), enlarged claw with a vestigial preapical tooth and four small bristles on proximal half; tarsal segment 5 with a distinct prominence towards its distal end, covering about one-third its length, four minute lamellae arise from distal end of prominence and about 14 bristles along most of its length, distally with about four lamellae (of which two are long) and a few bristles; hind femora moderately clavate, distal stalk about as long as proximal club which, in dorsal view, is three and a half times as long as broad.

Specimens seen: type ♀, Surrey, Wimbledon Common, 12.viii.1833 (*J. O. Westwood*) (H.W.).

There are two short notes attached by Westwood to the specimen.

(1). " Wimbledon Com. 12 Aug. 1833. On low plants at the sides of a pond. By sweeping. When alarmed it falls down and rolls itself up like a *Chrysis*. When alive the abdomen is thus [small figure of abdomen] and the whole insect is very like a *Sepsis* in its facies."

(2). " This perfectly agrees with Dalman's descriptn. of *Dr. formicarius* in Anal. Ent. except that Dalman does not mentn. the black stripe on the antr. tibia which he probably overlooked."

A search for this insect on Wimbledon Common has so far led to the discovery only of *G. sepsoides* Westw.

The following two genera and species are non-British but as they have been examined in the course of the present work they are redescribed.

Platygonatopus Kieffer, 1906.

Female in most features similar to *Gonatopus* Ljungh. Vertex between the eyes flat, not at all excavated. Enlarged claw of fore tarsus with a vestigial preapical tooth and five rather stout but very short bristles along its whole length, fifth tarsal segment with its inner edge straight, bearing a complete row of moderately broad lamellae and a distal group of 4–5 longer lamellae. Maxillary palpi with four segments, labial palpi with two (fig. 26). Transverse impression of pronotum distinct.

Male unknown.

Genotype: *Gonatopus planiceps* Kieffer, 1905b.

The above generic diagnosis is based on the genotype only.

Platygonatopus planiceps (Kieffer).

Gonatopus planiceps Kieffer, 1905b.

♀. Black; mandibles, segments 1–2 of antennae, articulations of all femora and tibiae and all tarsi paler. Surface apparently glabrous. Length 3·5 mm.

Vertex flat, rather strongly emarginate behind, moderately shining, weakly alutaceous, central keel distinct, ocelli small, posterior side of ocellar triangle hardly more than half as long as other two sides; antennae rather short and thick, segment 1 nearly twice as thick as 2, hardly as thick as 9, a little longer than 4, about two and a half times as long as broad, 3 a little shorter than 1 + 2, about as long as 4 + 5, five times as long as broad, 4–9 progressively shorter, 4 nearly three times, 9 one and a half times as long as broad, 10 as long as 5, two and a half times as long as broad. Pronotum moderately shining, weakly alutaceous, transverse impression distinct, disc one and a half times as long as broad; mesonotum

hardly longer than broad, dull, coarsely alutaceous; scutellum weakly defined, fully twice as broad as long, shining, postscutellar depression obsolete; meso-metapleural suture very weak, lying in a feeble depression of general surface of pleuron, mesopleuron moderately shining, weakly alutaceous; metathorax + propodeum (*i.e.* part behind scutellum) one and a half times as long as broad, sides a little rounded, in profile rising a little higher than the mesonotum, dorsal surface convex, set at an angle of 110° with posterior surface; whole surface dull, regularly and rather coarsely alutaceous, with almost no striae, even near orifice. Fore coxae a little less than twice as long as broad; fore trochanters distinctly less than half as long as fore femora, strongly thickened in centre, proximal stalk not

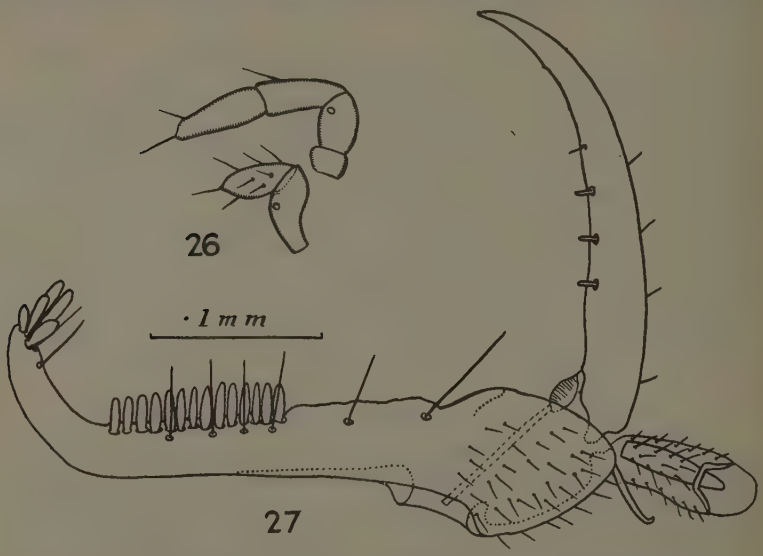


Fig. 26.—Maxillary and labial palpi of *Platygonatopus planiceps* (Kieff.) ♀.
Fig. 27.—Chela of *Epigonatopoides pulicarius* (Klug) ♀.

at all marked off; fore femora strongly thickened but hardly clavate, the thin distal part being hardly marked off, thickest part of femora nearly three times as thick as distal end of tibia; fore tarsi with segments 1–4 together almost as long as tibia, 1 and 4 very long, of equal length, 3 produced into a strong proximal anterior (inner) hook; chelae with enlarged claw bearing a vestigial preapical tooth and small but stout bristles along its proximal two-thirds; tarsal segment 5 with its inner edge nearly straight, distal end only moderately incurved, with a row of 17 moderately broad lamellae and 12 bristles along most of its length, distally with 4–5 longer and narrower lamellae; hind femora strongly clavate, distal stalk nearly one and a half times as long as proximal club, which, in dorsal view, is two and a half times as long as broad.

Specimens seen: Corsica ♀ (*T. A. Marshall*) (F.). This agrees closely with the original description. The species was described from the Italian island of Giglio.

In the Paris Museum I have examined the type of *Platygonatopus buyssoni* Berland, 1928, and 2 ♀♀ of *P. polychromus* Kieffer, 1905 var. *bernardi* Picard,

1932. It is very doubtful if they are congeneric with *P. planiceps* (Kieff.). They are much more robust and the propodeum has a strong central furrow. In the absence of a study of their mouth-parts, they cannot definitely be referred to a described genus. *Gonatopus pedestris* Dalman, 1818, was referred to this genus by Kieffer (1914). The type appears to be lost—the specimen sent from Stockholm as the type being *Anteon* (*C.*) *infectum* (Hal. *in* Curt.). Dalman (1823) synonymised his species with *G. formicarius* Ljungh, 1810. Unless the type can be rediscovered, the name *G. pedestris* is best ignored.

Epigonatopoides gen. n.

In most characters resembling *Gonatopus* Ljungh. Enlarged claw of fore tarsus without lamellae, but with four rather peg-like bristles, preapical tooth vestigial; tarsal segment 5 unusually strongly curved, central portion of inner edge nearly straight, with 14 small lamellae, a distal group of two large and three small lamellae. Maxillary palpi with four segments, distal one long and pointed, labial palpi with two segments, distal one oval. Pronotum not crossed by a transverse furrow. Antennae unusually short and thick.

Male unknown.

Genotype: *Gonatopus pulicarius* Klug, 1810.

Allied to *Epigonatopus* Perkins, 1905, but in that genus the pronotum is divided by a furrow.

Epigonatopoides pulicarius (Klug, 1810).

♀. Testaceous; head, anterior part of first abdominal tergite, and a few of the distal abdominal segments darker; last four or five antennal segments paler. Body almost glabrous. Length 2·25 mm.

Vertex weakly excavated and strongly emarginate behind, dull, alutaceous, central keel distinct, ocelli very reduced, posterior side of ocellar triangle about half as long as the two other sides; antennae short (not reaching back beyond the pronotum) and thick, segment 1 about twice as thick as 2, shorter than 2 + 3, a little longer than 4 + 5, 2 as long as 4, two and a half times as long as broad, 3 not very much longer than 2, about three times as long as broad, 4 and 5 not very different in length, about two and a half times as long as broad, 6–10 somewhat abruptly shorter and thicker, about one and a half times as long as broad, 10 only a little longer than 9. Pronotum moderately shining, weakly alutaceous, becoming more striate on sides ventrally, about one-third times as long again as greatest width, with only the slightest trace of a transverse furrow; mesonotum as long as broad, dull, striate; scutellum set at an angle to the mesonotum, not defined in front, weakly so behind, no impression behind it; meso-metapleural suture obsolete, no general depression of surface along its course, mesopleuron moderately shining, alutaceous with weak vertical striae; metathorax + propodeum, in dorsal view, hardly longer than broad, sides rounded, in profile not rising so high as anterior margin of mesonotum, dorsal surface forming a flattened curve, making an angle of about 100° with posterior surface; whole surface dull and alutaceous, with a few transverse striae anteriorly. Fore coxae not quite twice as long as broad; fore trochanters about half as long as femora, moderately thickened distally, thin proximal stalk not quite as long and half as thick as distal part; fore femora much thickened but hardly clavate, thickest part more than twice as thick as distal end of tibia; fore tarsi with segments 1–4 as long as the tibia, 1 and 4 very long, 4 a little the longer, 3 produced into a proximal anterior (inner) hook; chelae (fig. 27), enlarged claw with a vestigial preapical tooth and four rather peg-like bristles on proximal half of inner surface, outer surface also with about four small bristles; tarsal segment 5 with its central portion straight, bearing 14 small lamellae and 5 long bristles, apical portion strongly curved, bearing a

distal group of two long and three small lamellae and two bristles; hind femora clavate, distal stalk about as long as proximal club which, in dorsal view, is rather more than twice as long as broad.

Specimens examined: type ♀ "Deutschland" (*Klug*) (Univ. Mus., Berlin); Berlin ♀ (probably *Erichson*) (Zool. Inst. d. Univ., Berlin).

Males of British Gonatopodini.

Four types of males have been recognised but only one can be assigned with even moderate certainty to a described female. The males are therefore given numbers until observations show their true position.

Species 1.

Black, including mandibles; narrow distal ring to all trochanters, narrow end of fore femora, whole of fore tibiae, testaceous; fore tarsi and four hind tibiae proximally hardly paler. Wings hyaline, pterostigma and veins Sc + R + M, and Rs dark brown, other veins very pale. Length 2·3 mm.

Head transverse, deeply emarginate behind, protuberant though not keeled between antennae; malar space about two-thirds as long as eyes, not quite as long as antennal segment 3; eyes very convex, nearly hemispherical, densely hairy, space between them rather more than twice as wide as long; ocelli in a curved line (hardly forming a triangle), lateral pair almost on edge of occiput, which is not margined; POL : OOL as about 3 : 2; vertex dull and weakly rugose throughout, head in side view strongly buccate, tempora below about as broad as eyes; antennae a little longer than head + thorax, about three-quarters as long as fore-wing, segment 1 thick, twice as long as broad, one and a half times as long as 2, shorter than 3 or 9, segment 3 as thick as 1, not quite three times as long as broad, distinctly shorter than 1 + 2, 4–9 of similar thickness becoming progressively a very little shorter, so that 9 is only a fraction shorter than 3, 10 about four times as long as broad, 2–10 with dense pubescence which is about half as long as width of segments. Maxillary palpi (fig. 28) with four segments, first very short but quite distinct, fourth much longer than third; labial palpi with two segments. Pronotum invisible from above, sculptured like mesonotum, with a few weak striae in lateral impression; mesonotum about twice as wide as long, dull, rather closely shagreened and pubescent, becoming a little more shining posteriorly, notaulices very weak, posteriorly hardly traceable, strongly converging but running parallel a little distance apart for a short way before scutellum, posterior mesonotal margin weakly impressed, not crenate; scutellum flat, unpunctured, finely shagreened, dull, two-thirds as long as mesonotum; metanotum (= postscutellum) weakly convex, smooth and shining, half as long as scutellum, from which it is separated by a crenate furrow; mesopleuron with episternum divided into dorsal and ventral parts by an oblique furrow, epimeron represented only by a narrow posterior crenate depression, surface dull, finely shagreened; metapleuron weakly striate; propodeum with a transverse crenate furrow anteriorly and a weak irregular central dorsal depression, dorsal face rather more than half as long as posterior one, which makes an obtuse angle with it, whole surface dull, rather finely, irregularly rugose. Fore basitarsus nearly as long as next three segments. Fore-wings (cf. fig. 39) with pterostigma about four times as long as broad, distally tapering very gradually on to costa; radius curved, distal part becoming nearly straight, its end separated from costal margin of wing by less than an eighth of its length, extending some way beyond end of costa, medialis (= M + mcu) very weak, slightly curved. Abdomen a little longer than head and thorax, weakly clavate, smooth and shining; ninth sternite (fig. 29) with the proximal stalk beginning to broaden long before it meets disc which bears nine circular spots containing very short, peg-like structures; genitalia (fig.

30) with parameres not much diverging at apex, dorsally on distal half with about eight circular spots on each (besides the smaller spots on the apical hooks); basal process of gonoforceps short, exterior edge membranous; basivolsella with four apical ventral bristles; distivolsella with two feeble teeth at apex which bears one long curved bristle and one minute straight one.

Specimens examined: Ireland, Sligo, Trewalua, ♂, 10.vii.1936 (*A.W.S.*). I cannot suggest with what female this male could be associated. I have also

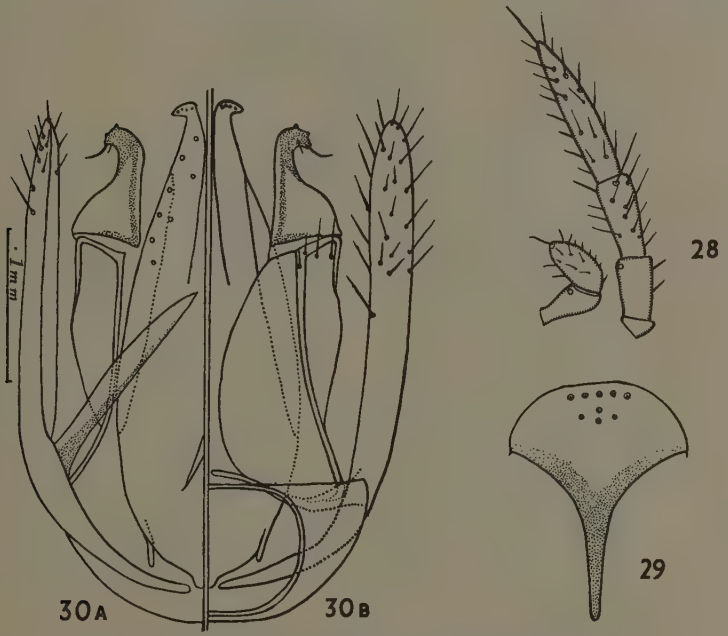


Fig. 28.—Gonatopodini ♂ sp. 1, maxillary and labial palpi.
Fig. 29.—Same species, ventral view of ninth abdominal sternite.
Fig. 30.—Same species, genitalia, (a) dorsal, (b) ventral view.

examined the type of *Labeo nigerrimus* Förster, 1861, kindly sent from Vienna by Herr Prof. Dr. F. Maidl. It agrees closely with Species 1 (the mouth-parts were not dissected). The male genitalia seem to be identical. The ninth sternite bears 12 bristle-bases, but it appears that they bore long bristles, not peg-like structures; possibly in the Irish specimen the peg-like structures are only the bases of broken bristles, though they do not appear to be so. In *L. nigerrimus* the notaulices appear to meet before the hind margin of the mesonotum and the radial vein just reaches the costa though distally very thin. These two differences are probably without significance.

Species 2.

Resembles species 1, except in the following particulars: Mandibular teeth pitchy. Veins M + mcu, Cu + 1A more pigmented. Length 2·3 mm.

Ocelli in a broad-based triangle, POL : OOL as 4 : 3. Maxillary palpi with five segments, labial with three (fig. 31). Mesonotum a little more finely shagreened and more

shining, notaulices a little stronger, distinctly separated at scutellum, area between them a little depressed; scutellum with a few weak punctures; central depression of propodeum bounded by feebly raised parallel lines, dorsal face about two-thirds as long as posterior one. Fore-wings with radius rather more strongly curved, its end separated from costal margin of

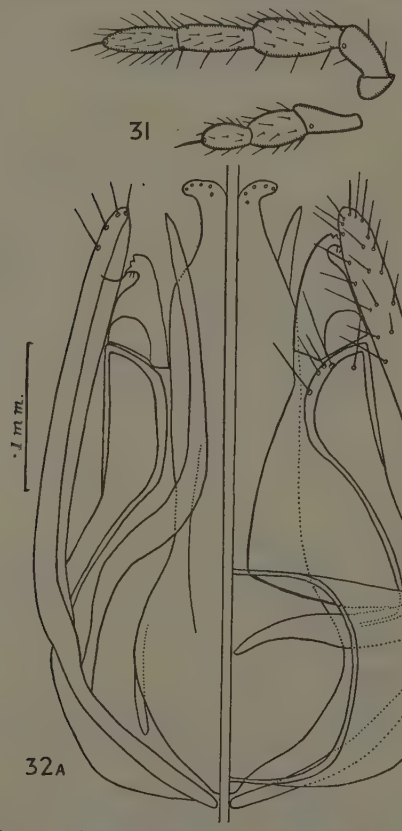


Fig. 31.—Gonatopodini ♂ sp. 2, maxillary and labial palpi.
Fig. 32.—Same species, genitalia, (a) dorsal, (b) ventral view.

wing by about one-sixth its length, not extending beyond costa, radialis (= M + mcu) straight. Abdomen hardly longer than thorax, ovate, ninth sternite with proximal stalk not broadening till just before it joins the disc which bears 16 long bristles; genitalia (fig. 32) with parameres not much divergent at apex, without circular spots; basal process of gonoforceps long, very narrow and sinuate; basivolsella with five apical ventral bristles; distivolsella with apex distinctly tridentate, with a long curved bristle and two minute straight ones.

Specimens examined: ♂, no data, but very probably Dorset, Glanvilles Wootton (H.D.) (labelled *Aphelopus melaleucus* in coll.).

I hazard the guess that this is the male of *Plectrogonatopus striatus* (Kieff.).

Species 3.

Resembles species 1 except in the following particulars: Mandibles brown; distal third of fore femora, fore tibiae and tarsi, junction of mid and hind tibiae with their femora, light brown. Pterostigma brown, venation yellowish. Length 2·0–2·5 mm.

Ocelli in a very broad-based triangle, POL : OOL as 3 : 2. Maxillary palpi with four segments, first very short, third and fourth of about equal length (figs. 33–5). Antennae considerably longer than head and thorax, thin, 3–9 four times as long as broad, 9 about

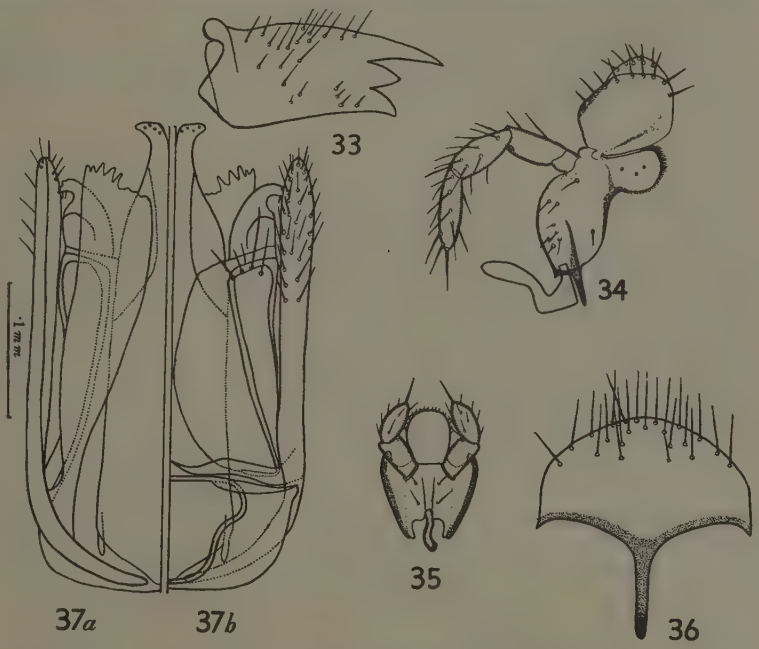


Fig. 33.—Gonatopodini ♂ sp. 3, right mandible.
Fig. 34.—Same species, ventral view of right maxilla.
Fig. 35.—Same species, ventral view of labium.
Fig. 36.—Same species, ventral view of ninth abdominal sternite.
Fig. 37.—Same species, genitalia, (a) dorsal, (b) ventral view.

three and a half times, 10 a little longer than 3. Mesonotum more shining, especially posteriorly, shagreening weaker, notaulices stronger, not quite meeting at posterior margin (details somewhat variable); scutellum shining with a few fine punctures; propodeum with irregular central depression more or less shining and less sculptured than surrounding parts, defined by more or less distinct raised lines, dorsal face as long or rather longer than the posterior one. Ninth sternite (fig. 36) usually with proximal stalk parallel-sided, but in one specimen broadening before meeting disc which bears 18–24 long bristles (18, 20, 21, 22, 23, 24, 16 [15]); genitalia (fig. 37) with parameres not much divergent at apex, without circular spots; basal process of gonoforceps long and broad, with a large membranous apical part which is truncate and serrate; basivolsella with 3–5 bristles, usually 4 or 5; disti-

[15] This specimen has, I think, lost part of the distal part of the sternite in dissection and probably really had twenty or more bristles.

volsella distally irregularly toothed, not usually distinctly tridentate, end bristles rather smaller than in other species, one or two minute straight bristles before apex.

Specimens examined ♂♂: Scotland, Renfrew, Bishopton (*P. Cameron*) (B.M.); Westmorland, Rydal Water, bred nymph *Cryomorphus* sp., coll. 29.vi., spun 5.vii.1936, em. 8.vi.1937 (*O.W.R.*); Surrey, Horsley, 14.vi.1930 (*G. E. J. Nixon*); Devon South, Dartmoor, Lustleigh, vi.1934 (*J. F. Perkins*) (B.M.); Ireland, Wicklow, The Murrough, 30.v.1937 (*A.W.S.*) 5 ex.; no data (Walker coll.) (B.M.).

As a male of this species has been bred from a Delphacid it must, presumably, correspond to a female with lamellae on the claw of the fore tarsi. It is not possible yet to suggest which species, particularly as no female of that type (other than *Dicondylus*) has been found so far north.

Species 4.

Not clearly separable from species 3 except in the mouth-parts and genitalia.

Propodeum with dorsal face perhaps usually rather longer in proportion to posterior face; sculpture usually distinctly coarser; scutellum often a little shagreened. Wings (fig. 39). Labial palpi with two segments; maxillary palpi (fig. 38) with three or four segments, proximal segment always very short and more or less fused with second, structure variable as follows: specimen no. 5, proximal segment hardly traceable, distal segment (= 3 + 4) considerably longer than second, palp without very careful study appearing 2-segmented; no. 1, 4-segmented but 3 and 4 nearly fused, 4 distinctly shorter than 3; nos. 2, 4, 6 and 8, 4-segmented, fourth distinct from third but only from one-half to two-thirds its length; no. 3 and no. 9, 4-segmented, 4 three-quarters as long as 3 (*i.e.* not very different from species 3). Ninth sternite (fig. 40) with the proximal stalk broadening some, usually a considerable, distance before it joins disc which bears 13–25 bristles (one 13, one 17, four 18, four 19, two 20, two 21, one 24, one 25); genitalia (fig. 41) with parameres widely diverging towards apex, dorsally on distal half with about four minute circular spots on each (besides the smaller spots on apical hooks); basal process of gonoforceps rather short (not nearly as long as parameres), very little membranous; basivolsella usually with four distal ventral bristles, rarely five; distivolsella clearly tridentate with one long curved apical bristle and one minute straight one.

Specimens examined ♂♂: Cambs, no. 2. Cambridge (*J. O. Westwood*) (B.M.), no. 3. Cambridge, Madingley on birch 30.vi.1936 (*G. C. Varley*) (Ca.), no. 8. Gogmagog Hills, 27.vii.1937 (*R. L. E. Ford*) (B.M.); Bucks, no. 5. Burnham Beeches, bred nymph *Dicranotropis hamata* (Boh.) coll. 25.iii., em. 27.vi.1935 (*A. I. Hassan*); Herts, no. 9. Harpenden, bred nymph of *Cryomorphus albomarginatus* Curt. 12.vii.1938 (*B. S. Williams*) (Bl.); Devon South, no. 4. Torquay district, viii.1929 (*G. E. J. Nixon*); Ireland, no. 6. no data (Haliday coll.) (D.), no. 7. no data (Haliday coll.) (D.) (type of *Labeo vitripennis* Hal.), no. 1. no data (Stephens coll.) (B.M.), 7 ex. no data (Haliday coll.) (D.) (3 det. as *L. excisus*).

At the same time as the specimen bred from *Dicranotropis* by Dr. A. I. Hassan, a female of *Dicondylus bicolor* (Hal. *in* Curt.) was also bred. Another female was bred from this host at Slough, a few miles away. Mr. B. S. Williams also bred one of these males with a female of *D. bicolor* from a nymph of *Cryomorphus albomarginatus* Curt. at Harpenden. There is little doubt, therefore, that Species 4 males belong to *D. bicolor* females.

The male collected by Westwood at Cambridge may be the type of *Labeo excisus* Westwood, 1833a. That species was described from Cambridge, but

the type is not to be found in the Hope–Westwood collection at Oxford. The present specimen, although in the British Museum collection, bears no registration number; besides the specific name, it bears only a label " Cambs " in Westwood's writing (there are many exactly similar labels on specimens of *Anteon*, etc., in the Hope–Westwood collection). I think it highly probable, therefore, that this specimen is the type of *L. excisus*; the specific name falls as a synonym of *D. bicolor* (Hal. *in* Curt., 1828). The mouth-parts of the type

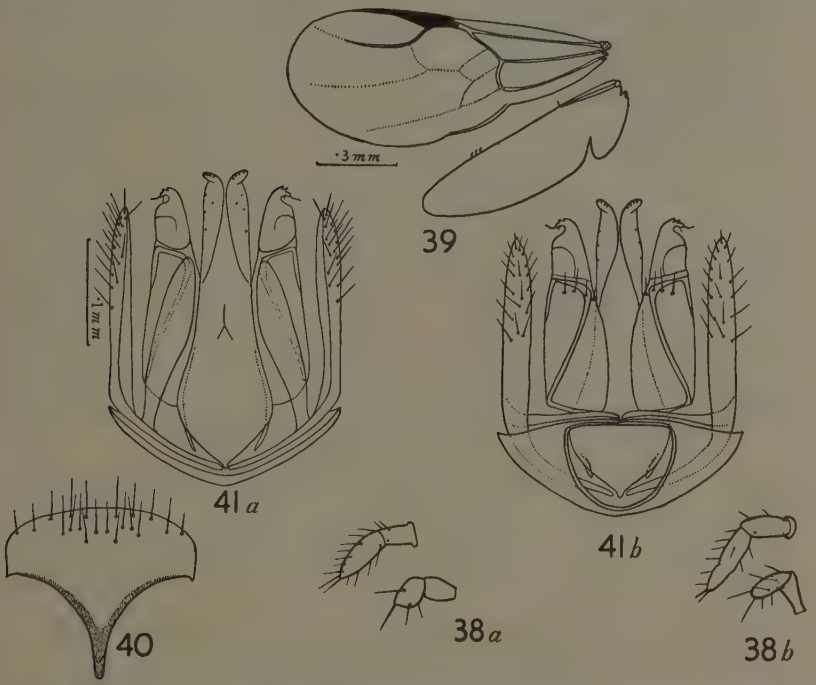


Fig. 38.—Gonatopodini ♂ sp. 4, maxillary and labial palpi (a) specimen 5 of text, (b) specimen 1 of text.
Fig. 39.—Same species, left wings.
Fig. 40.—Same species, ventral view of ninth abdominal sternite.
Fig. 41.—Same species, genitalia, (a) dorsal, (b) ventral view.

of *Labeo vitripennis* Hal. were not examined but the genitalia show clearly that it belongs here. It has been stated that the occiput of *L. vitripennis* is truncate, but this is incorrect. It is deeply emarginate, as in the other species.

6. The British genera and species of Dryinini.

1. Notaulices (" parapsidal furrows ") not developed *Mesodryinus* Kieffer. p. 227.
–. Notaulices complete, extending from anterior margin of the mesonotum to the scutellum . . . . . *Dryinus* Latreille. p. 229.

Mesodryinus Kieffer, 1906.

Antennae thin. Eyes bare. Vertex flat, raised occipital margin visible for only a very short distance just behind the ocelli. Pronotum broadly pyriform, disc not much raised, not

crossed by a transverse impression anteriorly, posterior margin somewhat depressed and contracted. Mesonotum without notaulices. Wing venation as in fig. 43. Enlarged claw of fore tarsi with lamellae and bristles.

Male. Unknown.

Genotype: *Dryinus niger* Kieffer, 1905, by designation of Kieffer, 1906: 497. The genus is recorded from Europe, Seychelles, India, and N. and C. America.

Mesodryinus britannicus sp. n.

♀. Black; mandibles, clypeus (except small posterior spot), antennae (which, however, become brown distally), narrow antero-lateral pronotal margin, and legs testaceous; streak

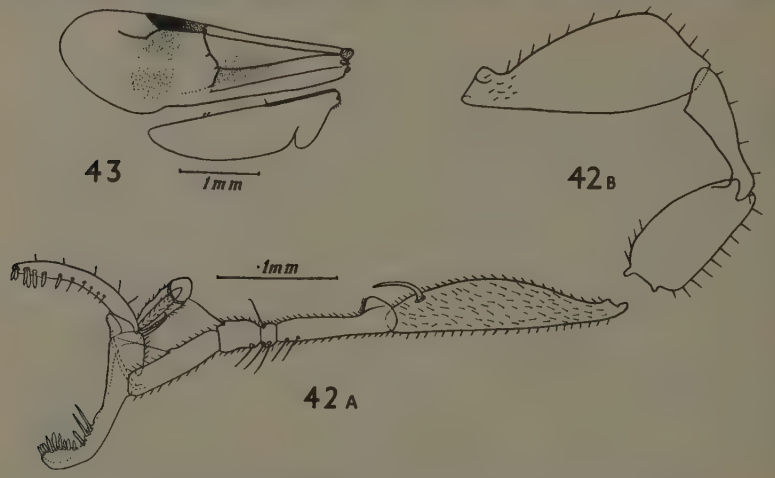


Fig. 42.—Fore leg of *Mesodryinus brittanicus* sp. n. ♀, (a) tibia and tarsus, (b) coxa, trochanter and femur.
Fig. 43.—Same species, left wings ♀.

beneath fore and mid femora, mid tibiae distally beneath, most of hind coxae proximally, hind femora beneath and distally, hind tibiae distally, last segment of four hind tarsi darkened. Tegulae testaceous. Wings hyaline, pterostigma brown with pale proximal patch, veins mostly pale except where crossed by dark bands, which lie on M + mcu and across the pterostigma. Body, except abdomen, covered with moderately close, outstanding, short, white pubescence. Length 4·0 mm.

Head with eyes about two and a half times as broad as long, posteriorly widely but shallowly emarginate, eyes occupying whole side of head; vertex dull, closely but finely rugose; ocelli in an equilateral triangle, POL : OOL = 3 : 4, hind ocelli on the posterior margin which between them is raised into a very fine transverse keel; antennae with segment 1 curved, about two and a half times as long as broad, as long as 6, 2 distinctly thinner, rather more than twice as long as broad, shorter than 9, 3 very elongate, much longer than 1 + 2, about as long as 4 + 5, ten to twelve times as long as broad, 4–9 gradually decreasing in length but increasing very little in thickness, 4 about six, 9 nearly three times as long as broad, 10 a little longer than 9. Pronotum broadly pyriform, broader in front than behind, no transverse impression, anterior margin a little emarginate, posterior margin at a distinctly

lower level than disc, surface dull, finely coriaceous, becoming alutaceous and more shining in front and at sides, near posterior margin tending to become striate; mesonotum twice as broad as long, without trace of notaulices, dull, with close, moderately regular, reticulate rugosities; furrow between mesonotum and scutellum, straight, weak, not crenate; scutellum flat, more shining and more weakly rugose than mesonotum, two-thirds as long; metanotum (" postscutellum ") hardly more than one-third as long as scutellum, sculptured like it on broad central area at sides of which are five or six longitudinal striae; mesopleuron apparently sculptured like the mesonotum; metapleuron below shining, weakly transversely striate, above ending in a dull, oval, pubescent area; propodeum dull, regularly and rather strongly reticulately rugose throughout, dorsal surface a little broader than long, quite rounded both laterally and posteriorly, as long as posterior surface, and set at right angles to it. Fore coxa (fig. 42) less than twice as long as broad, very thick; fore trochanter strongly clavate, distally at least twice as thick as proximally, a little longer than the coxa, about two and a half times as long as greatest thickness; fore femur strongly thickened but with almost no distal stalk, about four times as long as its greatest thickness; fore tibiae about three-quarters as long as all tarsal segments together; fore tarsi with segment 1 about as long as 3 + 4, 2 produced into an anterior hook, 4 itself elongate; articulating part of 5 only one-quarter as long as 4, free part of 5 as long as 3 + 4, regularly curved with a distal group of about 9 lamellae and 3 long ones near them, proximal part bare, enlarged claw curved, three-quarters as long as segment 5, with 7 lamellae on distal half and 5 more proximal bristles, external surface also with some short bristles; hind femur feebly clavate, distal stalk less than one-quarter as long as total length. Fore-wings with pterostigma four times as long as broad; radius sharply angled, distal section a little longer than proximal one, unenclosed radial cell about one and a half times as broad as long. Abdomen with seven distinct segments, first only very slightly petiolate, surface smooth and shiny, bare.

Type ♀, Dorset, Glanvilles Wootton, 23.vii.1900 (*Dale*) (H.D.). In Kieffer's key (1914 : 30), this species runs down to *M. corsicus* (T. A. Marshall), but the head is not coarsely rugose and the third antennal segment is more than twice as long as the first and much longer than the fourth.

Dryinus Latreille, 1804a *nec* Fabricius, [1805].

Lestodryinus Kieffer, 1911a.

Antennae very long and thin. Eyes bare. Vertex broadly but shallowly excavated, occipital margin raised. Pronotum with disc much raised, posteriorly considerably depressed and contracted. Mesonotum with complete notaulices. Venation not very different from *Mesodryinus* (fig. 43). Enlarged claw of fore tarsi with lamellae or spines.

Male. Unknown (but cf. Haupt, 1938).

Genotype: *Dryinus formicarius* Latreille, 1804 (only species placed in genus when species first cited). The genus is known from Europe, Asia and S. Africa.

Dryinus formicarius Latreille, 1804.

♀. Red; spot including the ocelli, scutellum anteriorly, propodeum and abdomen (except anterior part of second tergite), black; raised part of pronotum paler. Wings brown with two hyaline bands, one across base of pterostigma, the other across end of radial vein. Length 7·0–8·0 mm.

Vertex closely punctured with a complete central keel; antennae very long, reaching to middle of abdomen, distally a little thickened, segment 1 two to three times as long as broad, 2 twice, 3 four times, 4 three times as long as 1, 9 twice as long as broad. Pronotum clearly longer than the mesonotum, smooth; mesonotum closely punctured, with parallel notaulices, which posteriorly are separated from one another by same distance as is one of them from the sides of the scutellum; scutellum punctured; propodeum coarsely rugose. Fore legs with segment 1 elongate, 2 transverse, 3 twice as long as 2, 4 a little shorter than 1, 5 as long as 3, with continuous row of numerous lamellae, enlarged claw with strong preapical tooth and complete row of small lamellae.

The above description is based on Kieffer's account (1914 : 20). Curtis (1828) mentions a female "taken I believe at Ripley in August." Marshall (1874) mentions what is probably the same specimen as "captured by Baly near Cobham," now in coll. Westwood. It has not been possible to find the specimen in the Hope–Westwood collection, nor the type which according to Kieffer (1905 : 79) should be there also. Capron (1885) beat a female out of a bush of maple at Shere; the bush contained many *Cixius* "*contaminatus*" which he suggests may be the host. There appear therefore to be two recorded British females, both from Surrey and both apparently lost.

Maneval (1935) saw a female at Le Puy, France, 11.vi.1931, chasing a *Cixius nervosus* (L.) on the leaves of oak. The hopper succeeded in escaping. Haupt (1932) figured the larval sac of *D. formicarius* Latr. projecting from beneath the abdomen of a *Cixius nervosus* (L.).

In the Paris Museum, there is a female labelled "Bellinchen (Oder) 5.vii.1934 (Haupt)." With it is an elongate white cocoon, 12 mm. long on a plant stem and the parasitised nymph of *Fulgora europaea* L. with a large sac under the left wing-pads.

7. The British genera and species of Anteonini.

1. Distal part of radial vein at least as long as the proximal (fig. 49). Female with fore basitarsus as long as segments 3 + 4, 5 stout, articulating part little longer than 4, free part bearing two rows of minute lamellae. Antennal segments more or less elongate. Female sometimes brachypterous. Male genitalia without membranous processes from the proximal part of gonoforceps . . . . . *Prenanteon* Kieffer. p. 231.
–. Distal part of radial shorter (fig. 72), usually much shorter, than the proximal, the two parts also usually forming more of an angle. (Exceptional males of *Anteon* (*C.*) *lucidum* (Hal. *in* Curt.) may have wing-venation very nearly as in *Prenanteon*, but the antennal segments are much shorter.) Female always winged. Male genitalia usually with membranous processes from proximal part of gonoforceps *Anteon* Jurine 2.
2. Males (without chelae, antennae longer and more pubescent).
–. Females . . . . . 3.
3. Fourth segment of fore tarsi much shorter than the basitarsus. Pronotum transverse . . . . . *Anteon* Jurine *s.s.* p. 232.
–. Fourth segment of fore tarsi two-thirds as long to rather longer than the basitarsus . . . . . 4.
4. Pronotum as long or longer than broad. . subgenus *Chelogynus* Haliday *s.s.* p. 232.
–. Pronotum much broader than long group of *A.* (*C.*) *infectum* (Hal. *in* Walk.). p. 232.

Key to the British species of Prenanteon *Kieff.*

Females.

1. Head almost or quite unpunctured (sometimes a few very fine ones). Antennae entirely yellow (rarely somewhat brown-tinged), of moderate length. Legs entirely yellow, only hind coxae a little black proximally. Propodeum not at all sharply truncate posteriorly. Small species *P. daos* (Walker). p. 236.
2. Clypeus and a large spot above, extending well above antennae, bright yellow. Propodeum posteriorly sharply truncate. Small species *P. frontalis* (Dalman). p. 245.
–. At most clypeus yellow and a small spot above it but below the antennae reddish. Propodeum not sharply truncate posteriorly. Larger species, sometimes brachypterous . . . . . *P. ruficornis* (Dalman). 3.
3. Wings not reaching beyond propodeum . var. *subapterus* (Kieffer). p. 243.
–. Wings reaching at least to the end of third abdominal tergite . . . . 4.
4. Antennae black, segments 1–2, sometimes also 3 and 4 proximally, yellow, often sharply so. Legs yellow, hind coxae proximally, hind femora distally, black. Clypeus black. Pronotum with posterior half very sparsely punctured. Pterostigma usually darker . . . . . 5.
–. Antennae entirely yellow, or with segments 3 or 4 to 6 or 7 brownish, rarely the antennae entirely brown-tinged. Legs yellow, hind coxae proximally black . . . . . 6.
5. Antennae longer, penultimate segment about three times as long as broad. Antennae black with segments 1–4 more or less pale, and 7 or 8 to 10 often pale beneath . . . . . var. *melanocera* (Kieffer). p. 242.
–. Antennae shorter, penultimate segment distinctly less than three times as long as broad. Antennae black with segments 1–2 sharply yellow var. *basalis* (Dalman). p. 242.
6. Clypeus yellow or reddish. Hind coxae nearly entirely yellow. Pronotum with posterior half shining, more or less punctured var. *longicornis* (Dalman). p. 241.
–. Clypeus black or very dark pitchy. Hind coxae with proximal half or more black. Pronotum usually with only a very narrow posterior strip which is not rugosely punctured . . . var. *ruficornis* (Dalman). p. 240.

Males (♂ of P. frontalis *(Dalm.) is unknown).*

1. Head usually much less punctured. Dorso-posterior region of mesepisternum more or less smooth. Femora mainly dark; mandibles often largely yellow; antennae rather thinner; size usually smaller, length 1·8–3·0 mm., average 2·29 mm. . . . . *P. daos* (Walker). p. 236.
–. Head usually more punctured. Dorso-posterior region of mesepisternum often coarsely rugose, rarely smooth. Femora often considerably yellow; antennae usually thicker; size larger, length 2·0–3·4 mm., average 2·65 mm. . . . . 2.
2. Mandibles usually black with a red tip. Antennal segment 1 black. Femora mainly dark, coxae usually entirely black, rarely with a small yellow distal portion. Length 2·0–3·4 mm., average 2·70 mm. *P. ruficornis* (Dalman) var. *fractinervis* (Kieffer). p. 244.
. Mandibles usually with at least distal half yellow. Antennal segment 1 often brownish. Legs entirely yellow, femora and coxae proximally sometimes more or less brown-tinged. Length 2·2–3·0 mm., average 2·56 mm. . . *P. ruficornis* (Dalman) var. *fuscicornis* (Dalman). p. 243.

Key to the British species of Anteon *Jurine.*

Females.

1. Fourth segment of fore tarsi much shorter than the first. Pronotum strongly transverse . . . . . *Anteon* Jurine *s.s.* 2.
–. Fourth segment of fore tarsi at least two-thirds as long as the first. subg. *Chelogynus* Haliday . . . . . 7.
2. Mesonotum dull and alutaceous. Vertex coarsely rugose. Posterior surface of propodeum without an enclosed area, separated from the dorsal surface by a strong, sinuate, transverse keel. Fourth tarsal segment produced laterally . . . . . 3.
–. Mesonotum shining, sometimes punctured, rarely feebly alutaceous behind. Posterior face of propodeum more or less clearly divided into three areas separated by two keels. Third tarsal segment produced laterally . . 4.
3. Ocellar triangle with posterior side usually fully half as long again as the other two sides, the posterior ocelli usually nearer the occiput. Vertex nearly always with a pattern of irregular raised lines on top of the general alutaceous sculpture. Antennae usually black, segments 1–2 sometimes brown, rarely yellowish. Legs rarely conspicuously yellow *A.* (*A.*) *brevicorne* (Dalman). p. 247.
–. Ocellar triangle usually with posterior side not or hardly longer than the other two sides, the posterior ocelli further from the occiput. Vertex very dull, densely alutaceous, less rugose. Antennae with segments 1–2 sharply yellow, legs mainly yellow *A.* (*A.*) *marginatum* Kieff. p. 249.
4. Vertex dull and alutaceous at sides, centre shining and finely punctured (rarely entirely alutaceous) but then more strongly so at sides, with no central keel. Mesonotum closely and finely punctured. Antennae black, femora mainly black, tibiae and tarsi yellowish. Fifth tarsal segment with a distal group of four lamellae *A.* (*A.*) *brachycerum* (Dalman). p. 250.
–. Vertex with much more uniform sculpture, alutaceous to rugose, not finely punctured, central keel distinct. Mesonotum sparsely punctured. Sometimes legs mainly or entirely yellow . . . . . 5.
5. Larger species. Sculpture of vertex consisting more of punctures and rugosities, less alutaceous, more shining. Central area of propodeum more shining, smoother. Tarsal segment 5 with a distal group of 26 lamellae 6.
–. Smaller species. Sculpture of vertex mainly alutaceous, duller. Central area of propodeum duller, more rugose. Tarsal segment 5 with a distal group of 16 lamellae. Antennae mainly dark, segment 1 yellow beneath and narrow apices of segments or sometimes rest of ventral surface yellow. At least proximal half of all coxae and most of hind femora black . . . . . *A.* (*A.*) *jurineanum* Latreille. p. 256.
6. Antennae and legs entirely yellow . *A.* (*A.*) *flavicorne* (Dalman). p. 253.
–. Antennae and femora mainly black *A. flavicorne* var. *bensoni* var. n. p. 255.
7. Pronotum much broader than long. Propodeum posteriorly with a strongly defined central area which is much more smooth and shining than the parts outside the area. Head strongly, often subrugosely, punctured. Wings usually distally infuscate, pterostigma mainly dark 8.
–. Pronotum three-quarters as long to rather longer than broad. Propodeum posteriorly with no distinct area or, if there is one, with its surface almost as strongly sculptured as the parts outside . . . . . 10.
8. Antennae with segments 2 + 3 distinctly longer than 1. Larger. Head duller, coarsely and rugosely punctured. Mandibles dark; antennae black, yellow-brown beneath; legs brown, tibiae and tarsi, yellowish.

Tarsal segment 5 with two irregular rows of 41 and 30 lamellae respectively . . . . . *A.* (*C.*) *scapulare* (Haliday *in* Walker). p. 260.

–. Antennae with segments 2 + 3 hardly longer than 1. Mandibles yellow . 9.

9. Head duller, more punctured. Hind femora mainly dark. Fifth tarsal segment with two rows of 24 and 12 lamellae respectively *A.* (*C.*) *infectum* (Haliday *in* Walker). p. 258.

–. Head more shining, less punctured. Hind femora yellow, darker proximally. Chela as in *A.* (*C.*) *scapulare* . *A.* (*C.*) *luteicorne* Kieffer. p. 262.

10. Vertex posteriorly not or hardly punctured . . . . . 11.

—. Vertex distinctly punctured . . . . . 16.

11. Species mainly black or brown . . . . . 12.

—. Species mainly pale yellow. (Propodeum black) . . . . . 14.

12. Head dull, closely alutaceous; vertex unpunctured, even in front. Antennal segment 9 at most one and a half times as long as broad. Fifth segment of tarsi with one row of bristles. Sometimes irregularly reddish tinged, especially the abdomen; antennae paler distally *A.* (*C.*) *fulviventre* (Haliday *in* Curtis). p. 264.

—. Head shining, weakly or not alutaceous; vertex more or less distinctly punctured in front. Antennal segment 9 nearly twice as long as broad. Fifth segment of fore tarsi with two rows of bristles besides the lamellae. Species mainly black, head, pronotum, and mesonotum often red-tinged; abdomen black . . . . . 13.

13. Antennae dark, proximal 1–2 or 1–3 segments sharply pale. Vertex shining, more punctured. Head and thorax black *A.* (*C.*) *lucidum* (Haliday *in* Curtis). p. 270.

—. Antennae brown or brown-yellow, intermediate segments sometimes darker, contrast rarely sharp. Vertex usually weakly alutaceous, punctures almost absent except quite anteriorly. Pronotum more or less distinctly pale or pale-marked *A.* (*C.*) *ephippiger* (Dalman) var. *collare* (Dalman). p. 268.

14. Head dull, alutaceous. Only propodeum black-marked. Fifth segment of fore tarsi with one row of bristles beside the lamellae *A.* (*C.*) *fulviventre* (Haliday *in* Curtis) var. *alutaceum* (Richards). p. 267.

—. Head shining. Fifth segment of fore tarsi with two rows of bristles besides the lamellae . . . . . 15.

15. Pronotum white. Mesopleuron black . *A.* (*C.*) *albidocolle* Kieffer. p. 270.

—. Pronotum yellow. Whole thorax yellow *A.* (*C.*) *ephippiger* (Dalman). p. 267.

16. Head and pronotum with close, shallow punctures, alutaceous and dull. Pronotum black; antennae black, segment 1 yellow. Chela with two rows of lamellae (about 30 in all), a distal group of about 12, and one row of bristles . . . . . *A.* (*C.*) *kiefferi* Chitty. p. 274.

—. Head and pronotum less punctured, not or hardly alutaceous, shining . 17.

17. Pronotum black. Antennae thinner, black with segments 1–2 or 1–3 paler. Chela with a row of 16 lamellae, a distal group of 5–6, and two rows of bristles. Small species, wings not shortened nor distally infuscate *A.* (*C.*) *lucidum* (Haliday *in* Curtis). p. 270.

—. Pronotum yellow. Antennae thicker . . . . . 18.

18. Small species. Wings not darkened or shortened. Pronotum three-quarters as long as broad. Segment 4 of fore tarsi clearly shorter than 1, 5 with two rows of about 18 lamellae in all, a distal group of about 7, and two rows of bristles . . . . . *A.* (*C.*) *rufulocolle* Chitty. p. 262.

—. Larger species. Wings distally infuscate, a little shortened. Pronotum as long as broad. Segment 4 of fore tarsi as long or nearly as long as 1, 5 with two rows of about 30 lamellae in all, and two rows of bristles . 19.

19. Larger. Head often a little alutaceous; antennae with segments longer, yellow with 7–10 black. Pronotum usually less punctured. Chela with a distal group of about 20 lamellae . . . *A.* (*C.*) *gaullei* Kieffer. p. 277.

—. Smaller. Head shining; antennae with segments shorter, black with 1–2 (more rarely 1–3 or 1–4) yellow or brown-yellow. Pronotum usually more punctured. Chela with a distal group of about 10 lamellae
A. (*C.*) *cameroni* Kieffer. p. 275.

Males. (*Those of* A. (C.) gaullei *Kieff.*, A. (C.) albidocolle *Kieff.*, A. (C.) kiefferi *Chitty, and* A. (C.) rufulocolle *Chitty are unknown.*)

1. Mesonotum distinctly alutaceous. Posterior face of propodeum with no central area but defined above by a strong sinuate transverse keel. Gonoforceps of genitalia (fig. 53) with no distal inner process. Pterostigma dark . . . . . 2.
–. Mesonotum not alutaceous. Posterior surface of propodeum with a more or less distinct central area but only weakly defined above . . . . . 3.
2. Antennae longer and thinner; sculpture of head and posterior surface of propodeum more rugose . . . . *A.* (*A.*) *brevicorne* (Dalman). p. 247.
–. Antennae shorter and less tapering; sculpture of head and posterior surface of propodeum more alutaceous or granulate, less rugose
A. (*A.*) *marginatum* Kieffer. p. 249.
3. Sides of vertex alutaceous, disc shining and finely punctured. Pterostigma dark. Gonoforceps of genitalia (fig. 57) with no distal inner process
A. (*A.*) *brachycerum* (Dalman). p. 250.
–. No marked contrast between sculpture of sides and disc of vertex. Gonoforceps of male genitalia with a distal inner process, except in *A.* (*C.*) *infectum* (Haliday) . . . . . 4.
4. Head entirely alutaceous, not punctured nor rugose. Usually entire legs (including coxae) except tip of hind femora yellow. Antennae with segment 1 yellow, other segments more or less darkened dorsally. Pterostigma pale . . . . . *A.* (*A.*) *jurineanum* Latreille. p. 256.
–. Head shining or else punctured or rugose. Pterostigma brown to light brown . . . . . 5.
5. Moderate to large species. Head closely and strongly punctured. Antennae (at least beneath) and legs mainly yellow . . . . . 6.
–. Small species (rarely of moderate size, *A.* (*C.*) *lucidum* vars.). Head not very closely punctured. Antennae less extensively yellow . . . . 7.
6. Head very closely, subconfluently punctured or even rugose. Posterior two-thirds of mesonotum smooth and shining. Central area of propodeum more distinct. Dorsal side of antennae entirely or mainly yellow, segment 1 hardly longer than 4. Gonoforceps of genitalia (fig. 60) with a strong distal inner process
A. (*A.*) *flavicorne* (Dalman). p. 253.
–. Like *A. flavicorne* but antennae dark dorsally and legs darker
A. flavicorne var. *bensoni* var. n. p. 255.
–. Head closely but very rarely nearly confluently punctured. Mesonotum with faint shallow punctures even posteriorly. Central area of propodeum not so distinct. Dorsal side of antennae black, at least of segments 1–6, segment 4 hardly longer than 1, gonoforceps of genitalia (fig. 66) with no distal inner process
A. (*C.*) *infectum* (Haliday *in* Walker). p. 258.
–. Resembles *A.* (*C.*) *infectum* (Hal. *in* Walk.) but hind legs yellow, antennal segment 4 longer than 1 . *A.* (*C.*) *scapulare* (Haliday *in* Walker). p. 260.
7. Legs entirely yellow or light yellow-brown, except extreme proximal part of hind coxae. Antennae blackish to yellowish-brown, segment 1 sometimes nearly yellow. Head shining, very indefinitely punctured, usually almost impunctate. Pterostigma lighter. Area of posterior surface of propodeum more distinct . . . . . 8.

–. Antennae and at least hind femora, usually most of all femora, black. Head more or less distinctly punctured. Pterostigma usually darker 9.

8. Genitalia resemble *A.* (*C.*) *ephippiger*. Antennae shorter *A.* (*C.*) *fulviventre* [16] (Haliday *in* Curtis). p. 264.

–. Genitalia resemble *A.* (*C.*) *lucidum*. Antennae longer *A.* (*C.*) *cameroni* Kieffer. p. 275.

9. Antennae longer and thinner, segment 4 nearly four times as long as broad. Propodeal area very indistinct. Distal inner process of gonoforceps of genitalia (fig. 72) with its distal angle a right angle or nearly so *A.* (*C.*) *ephippiger* (Dalman). p. 267.

–. Antennae shorter and thicker, segment 4 about three times as long as broad. Posterior area of propodeum usually well defined. Distal inner process of gonoforceps of genitalia (fig. 75) longer, distal angle acute . . . . . *A.* (*C.*) *lucidum* (Haliday *in* Curtis). p. 270.

A note on the males of *Anteon*.

In the subgenus *Anteon s.s.* the males are sufficiently like the females for correct association with them to be moderately easy.

In the subgenus *Chelogynus* Hal., however, the males diverge more and more and, except in the group of *A.* (*C.*) *infectum* (Hal.), the association is largely a matter of guess-work. The following data as to numbers of specimens captured have assisted me in assigning the sexes in the way I have.

	♀♀	♂♂
A. (*C.*) *lucidum*	39	191
A. (*C.*) *ephippiger*	30	67
A. (*C.*) *fulviventre*	27	28
A. (*C.*) *cameroni*	21	2

Of the following species males are unknown: *A.* (*C.*) *gaullei* (15 ♀♀), *A.* (*C.*) *albidocolle* (3), *A.* (*C.*) *kiefferi* (3), *A.* (*C.*) *rufulocolle* (1).

If it is supposed that, owing to their rarity, no males have been obtained of the last four species, the other suggested associations are in reasonable agreement with the frequency of capture. The relation of male to male is of the same order as that of female to female in *A.* (*C.*) *lucidum* and *A.* (*C.*) *ephippiger*. The male assigned to *A.* (*C.*) *fulviventre* agrees with the female in the reduced punctation. The males are found over such a short period that one can never rely on capturing males and females in one locality. Nevertheless, the detailed distribution data do not seriously disagree with the associations suggested above. Only breeding or mating experiments can finally decide these questions. Meanwhile, the locality-records have been kept separate for each sex in doubtful cases.

Prenanteon Kieffer, 1913a.

Second sector of radial vein (fig. 49) in fore-wing as long as first sector. Fourth segment of fore tarsi (figs. 44, 45) in female, shorter, but not very much shorter, than the basitarsus; fifth segment with a row of minute lamellae, three rows of bristles, and a distal group of larger lamellae.

Genotype (fixed by Richards, 1935) = *Anteon melanocera* Kieffer, 1905 = *P. ruficornis* (Dalman, 1818) var.

[16] Typical specimens differ sharply from *Anteon jurineanum* Latr. in the sculpture of the head, but some varieties are much less distinct in this respect. The shorter notaulices and the dark tip to the hind femora (when fully developed) are characteristic of *A. jurineanum*.

Synonym: *Psilanteon* [17] Kieffer, 1913a. Genotype (genus monobasic) = *Anteon aequalis* Kieffer, 1905 = *P. daos* (Walker, 1837). **Syn. n.** The genus is known from Europe and the U.S.A.

The males are not very like the corresponding females in this genus, but the small number of species involved makes it fairly certain that the sexes have been correctly associated. Even more difficult is the problem of segregating the males of *P. daos* and *P. ruficornis*; a complete separation seems to be impossible, owing to the great variation in sculpture. In this genus, neither the chela of the female nor the genitalia of the male seems to have much value in separating species.

Prenanteon daos (Walker).

♀ *Anteon aequalis* Kieffer, 1905 : 177. **syn. n.**
A. vitellinipes Kieffer, 1905 : 181. **syn. n.**
♀ *A. longifilis* Kieffer, 1906.
♂ *Dryinus daos* Walker, 1837.
A. integer Kieffer, 1905 : 206.
A. curvinervis Kieffer, 1905 : 208. **syn. n.**
Antaeon beaumonti Chitty, 1908. **syn. n.**

♀. Black; palps, mandibles, antennae, legs (except small proximal area of hind coxae), tegulae, yellow; antennae sometimes a little brown-tinged, but no part distinctly or sharply darkened; hind femora rarely with a brown streak beneath, but no distinct black distal area. Wings hyaline, pterostigma and venation translucent yellow. Surface of body (except abdomen) with rather sparse pale hairs, more numerous on face. Length 2·3–2·75 mm.

Eyes bare (sometimes a very few hairs distinguishable under high magnification); head, in dorsal view (including eyes), twice as broad as long, vertex between eyes a little broader than long, sides parallel in front, posteriorly with a weakly curved, feebly raised margin, the anterior side of which is hardly crenate; antennae of moderate length, little thickened, segment 1 cylindrical, little clavate or curved, two and a half times as long as broad, about as long as 5, considerably shorter than 3, 2 nearly cylindrical, a little more than twice as broad, little shorter than 9, 3 not quite as long as 1 + 2 or as 8 + 9, five times as long as broad, 4–9 progressively shorter and thicker, 4 a little shorter than 3, 9 about two and a half times as long as broad; 10 as long as 5, three times as long as broad; vertex shining, with sparse, very fine punctures (sometimes almost unpunctured); lateral and central keels obsolete; curved impression at sides of posterior ocelli very weak; ocellar triangle equilateral, POL : OOL as 3 : 4, lateral margins of head behind eyes as long as OOL, posterior ocelli removed from occiput by distance equal to POL. Pronotum twice as broad as long, sides considerably divergent behind, in profile with posterior half nearly flat and anterior half sloping moderately down to anterior margin, surface dull, rugose, posterior third smooth and shining with a few punctures; in lateral view rather deeply impressed, bottom of depression shining; mesonotum a little longer than the pronotum, shining, with a few large punctures on anterior half, notaulices short, extending over less than half its length; scutellum smooth and shining, a little convex, posterior crenate furrow very weak; metanotum (" postscutellum ") with even central area more or less dull and rugose; mesopleuron anteriorly rather dull, finely and closely punctured, postero-dorsally dull, rather finely rugose, postero-ventrally shining with a few punctures; metapleuron moderately shining, weakly rugose; propodeum with dorsal and posterior surface forming an almost regular curve, former a little shorter, surface dull, rather finely clathrately rugose, posterior area about twice as long as broad, feebly defined or sometimes absent. Abdomen bare and

[17] Kieffer, 1913, *Bull. Soc. ent. Fr.* **1913** : 301. The name *Prenanteon* has priority on the page.

shining. Fore legs (fig. 44) with basitarsus longer than segments 3 + 4 but shorter than 2 + 3 + 4, segment 2 more or less produced proximally, articulating part of 5 (fig. 45) a little longer than 4, free part of 5 as long as 3 + 4, segment 5 with a row of about 17 minute lamellae, two rows of bristles on one side of lamellae and one row on other, and, arising from the rather strongly incurved distal extremity, a distal group of about 5 lamellae, two or three of which are longer than others; enlarged claw rather stout and strongly curved. Fore-wings with radial vein regularly curved, not as long as the pterostigma.

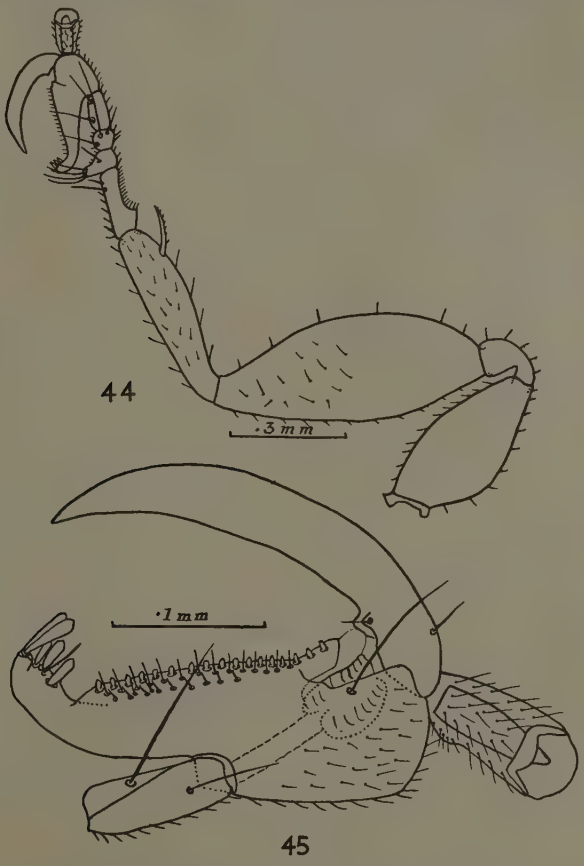


Fig. 44.—*Prenanteon daos* (Walker) fore leg ♀.
Fig. 45.—Same species, chela and fourth tarsal segment ♀.

♂. Black; palps, often a considerable part of mandibles, fore legs with distal third of femora and tibiae and tarsi, mid legs with about distal quarter of femora and proximal third of tibiae (rest of mid tibiae and tarsi brown) yellow; hind legs dark brown, tibiae and tarsi lighter (rarely femora of mid and hind legs are rather more yellow distally); tegulae testaceous. Wings hyaline, venation light brown, pterostigma lighter proximally. Surface of body (except abdomen) with rather sparse, outstanding, pale hairs. Length 1·8–3·0 mm., average 2·29 mm. (only 5 out of 40 specimens are longer than 2·5 mm.).

Eyes bare; head, in dorsal view (including eyes), twice as broad as long, vertex between eyes one and a half times as broad as long, sides a little divergent in front, posteriorly with a very weakly curved, feebly raised margin, anterior side of which is hardly crenate; antennae long, not thickened, segment 1 nearly cylindrical, considerably thicker than 2 or 3, much shorter than 3, a little shorter than 9, two and a half times as long as broad, 2 pyriform, one and a half times as long as broad, 3 nearly as long as 1 + 2, a little shorter than 4, nearly four times as long as broad, 4–9 becoming progressively a little shorter, 4 four times, 9 a little more than three times as long as broad, 9 a little shorter than 3, 10 as long as 4, all segments with outstanding pubescence about as long as diameter of segments (actually proportions of segments vary somewhat with size of specimen); vertex shining, characteristically very sparsely and finely punctured but sometimes rather more closely; lateral and central keels obsolete; curved impressions at sides of posterior ocelli nearly obsolete; ocellar triangle with posterior side considerably longer than others, POL : OOL as 4 : 5, lateral margins of head behind the eyes not quite as long as OOL, posterior ocelli removed from the occiput by about two-thirds of POL. Pronotum more than twice as broad as long, very little visible from above, rugose with a shining posterior strip; mesonotum a little broader than long, smooth and shining, usually almost unpunctured with anterior third somewhat rugose, notaulices extending across half its length, often with traces of two impressed lines between them anteriorly; scutellum smooth and shining, posterior crenate furrow distinct; metanotum ("postscutellum") with the central area more or less strongly rugose; mesopleuron anteriorly shining, weakly punctured, region where anterior and posterior parts join often strongly rugose, postero-dorsally smooth and shining, a little punctured (rarely weakly rugose), postero-ventrally smooth and shining. Metapleuron shining, feebly rugose; propodeum with dorsal and posterior surfaces forming a regular curve, surface moderately shining, coarsely rugose. Abdomen bare and shining; ninth sternite (fig. 46) with proximal stalk shorter than distal part which has two short lateral arms and an oval posterior area bearing a number of bristles; genitalia (fig. 47) with gonoforceps not produced inwards distally (other details subject to a good deal of variation, partly due to method of preparation). Fore-wings with radial vein more or less regularly curved, not quite as long as pterostigma.

Specimens examined ♀♀: Perth North, Glen Lyon (*P. Cameron*) (B.M.) (type of *Anteon aequalis* Kieffer); Stirling, Clober (*P. Cameron*) (B.M.) (type of *Anteon vitellinipes* Kieffer); Staffs, Maer Woods, 24.vi.1938 (H.B.); Suffolk West, 22.vi.1914 (M.); Surrey, Coombe Wood, vii. (H.W.), Richmond Park, 3 ex. (H.W.); Devon North, Croyde, vi.–vii.1927 (*K. G. Blair*) (Bl.); Scotland, Inverness East, Aviemore, 26.vi.1934 (*R. B. & J. E. Benson*) (B.M.); Perth North, Rannoch, 30.vi. and 20.vii.1927 (*J. J. F. X. King*) (G.); Aberdeen South, Braemar (F.) (labelled *Anteon lapponicus* Thoms.); Stirling, Clober (*P. Cameron*) (B.M.); Dumfries, Gretna, 31.vii.1936 (*J. Murray*); "Ireland" (*A. H. Haliday*) (D.); "British," 1 ex. (*A. H. Haliday*) (D.), 2 ex. (Walker coll.) (B.M.); no data 1 ex. (H.W.), 2 ex. (H.D.).

♂♂: Yorks Mid West, Ben Rydding, 2 ex., 4.viii.1931 and 2 ex., 6.viii.1931 (*A. M. Low*) (Nixon *leg.*) (one of the males has a deeply and rather closely punctured head); Suffolk West, Tuddenham Fen, 22.v.1911 and 5.vi.1916 (M.); Cambridge (H.W.); Hereford, Hay, viii.1934 (*C. G. Lamb*) (B.M.); Monmouth, Trelleck Beacons, 10.vi.1936 (*J. F. Perkins*) (B.M.); Gloucester West, Staunton, High Meadow Woods, 9.vi.1936 (*E. B. Britton* and *J. F. Perkins*) (B.M.); Surrey, Horsley, 30.v.1931, Oxshott, 9.viii.1930 (*G. E. J. Nixon*), Chobham, 23.vii.1894 (*A. Beaumont*) (M.) (type of *A. beaumonti* Chitty); Berks, Bagley Wood, 26.v.1935 (*G. J. Kerrich*) (Ca.); Hants South, Brockenhurst, 25–30.vi.1933 (*G. E. J. Nixon*); Somerset South, Porlock district, 19.v. and

21.v.1934 (*J. F. Perkins*) (B.M.); Scotland, Sutherland South, Bonar Bridge (*P. Cameron*) (B.M.) (identified as *A. parvicollis* Kieff.); Ebudes Mid, Mull (*P. Cameron*) (B.M.); Perth North, 3 ex. Rannoch (F.); Stirling, Mugdock (*P.*

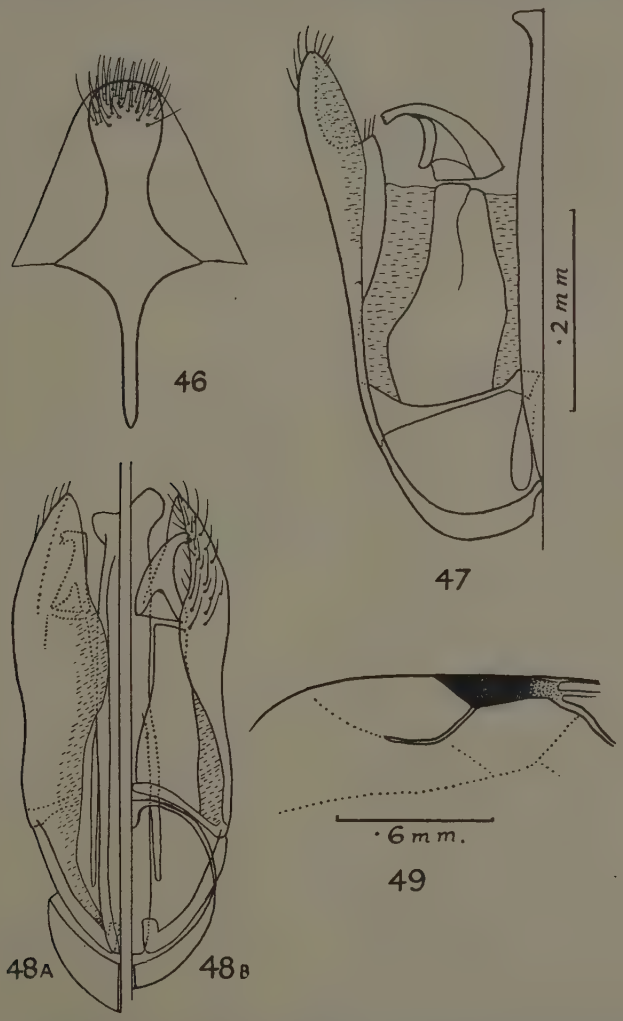


Fig. 46.—*Prenanteon daos* (Walker) ♂, ventral view of ninth abdominal sternite.
Fig. 47.—Same species, dorsal view of right half of ♂ genitalia (the angular process just before the extremity of the gonoforceps is often rounded off).
Fig. 48.—*Prenanteon ruficornis* (Dalm.) ♂ genitalia, (a) dorsal, (b) ventral view.
Fig. 49.—Same species, left fore-wing (region of pterostigma) ♀.

Cameron) (B.M.) (type of *A. integer* Kieff.); Dumfries, Gretna, 12.vii.1937 (*Jas. Murray*); Ireland, Antrim, Belfast, Cavehill, 15.vii. (*A. H. Haliday*)

(D.); Sligo, Trewalua, 10.vii.1936 (*A.W.S.*); Wicklow, Ennereilly, 23.vii.1929 (*A.W.S.*); Leitrim, vii.1933 (*G. E. J. Nixon*); Ireland (*A. H. Haliday*) (D.); 3 ex. "British" (*A. H. Haliday*) (D.); 3 ex. no data (H.W.), 1 ex. no data (B.M.), 1 ex. (Walker coll.) (B.M.); type ♂ of *Dryinus daos* Walker (D.) (*see* Richards, 1935 : 155); also 1 ♂ (P.) (labelled "*nitidulus* Först.").

I am strongly of the opinion that *P. daos* (Walk.) is the male of *P. aequalis* (Kieff.), but this difficult genus is so much in need of further study that it is best to keep the records separate for the present. The type of *Anteon longifilis* Kieffer, 1906 (♀), described from Braemar (coll. T. A. Marshall) is lost. It is probably a synonym of the present species.

There is no complete separation between *P. daos* and *P. ilus* (Walk.) var. *fractinervis* (Kieff.) (= male of *P. ruficornis* (Dalm.)). The majority of the specimens can be separated by the difference in the sculpture of the head and mesopleuron (especially if both be considered together), but a few specimens are almost exactly intermediate.

The variation of forty specimens of *P. daos* ♂ may be summarised as follows :—

(*a*) Mandibles. Entirely yellow 8, distal half yellow 16, distal half or less red 12, black 4.
(*b*) Head. Sparsely punctured 35, more closely punctured 5.
(*c*) Mesopleuron dorso-posterior region. More or less smooth 38, distinctly rugose 2.
(*d*) Legs. Of usual coloration 31, femora more yellow than usual 9.

Prenanteon ruficornis (Dalman).

♀ *Gonatopus ruficornis* Dalman, 1818 : 83.
G. basalis Dalman, 1818 : 84. **syn. n.**
Dryinus longicornis Dalman, 1823. **syn. n.**
D. crassimanus Haliday *in* Curtis, 1828. **syn. n.**
?*Dryinus retusus* Thomson, 1860.
Anteon subapterus Kieffer, 1905 : 138. **syn. n.**
A. melanocera Kieffer, 1905 : 179. **syn. n.**
A. crassiscapus Kieffer, 1905 : 180. **syn. n.**
A. procericornis Kieffer, 1905 : 184. **syn. n.**
A. luteipes Kieffer, 1905 : 187. **syn. n.**
A. declivis Kieffer, 1905 : 188. **syn. n.**
A. pallidinervis Kieffer, 1905 : 189. **syn. n.**
A. dolichocerus Kieffer, 1905 : 190. **syn. n.**
A. halidayi Kieffer, 1906. **syn. n.**
Chelogynus walkeri Kieffer, 1914. **syn. n.**
Dryinus flavicornis Haliday and Walker in part, not *Gonatopus flavicornis* Dalman, 1818.
♂ *Gonatopus fuscicornis* Dalman, 1818 : 87. **syn. n.**
Dryinus ilus Walker, 1837 : 424. **syn. n.**
D. misor Walker, 1837 : 424. **syn. n.**
Anteon parvicollis Kieffer, 1905 : 206. **syn. n.**
A. pyrenaicus Kieffer, 1905 : 207. **syn. n.**
A. fractinervis Kieffer, 1905 : 208. **syn. n.**
A. hyalinipennis Kieffer, 1905 : 209. **syn. n.**
Antaeon morleyi Chitty, 1908 : 144. **syn. n.**
A. luffnessensis Chitty, 1908 : 145. **syn. n.**
P. pyrenaicus var. *parcepunctatus* Kieffer, 1914. **syn. n.**

Very close to *P. daos* (Walk.) but differing as follows: clypeus usually black or very dark pitchy (except var. *longicornis* (Dalm.)); hind coxaep roximally half to three-quarters (rarely as little as one-quarter) black; antennae yellow or with some of segments 3–6 brown, rarely with segments 3–10 light brown. Length 3·0–4·0 mm.

Antennae longer and less thickened (especially in the larger specimens), segment 1 two and a half to (in large specimens) three times as long as broad, in large specimens shorter

than 5, almost as long as 7, in small specimens as long as 5 or 6, segment 3 usually fully six times as long as broad, 9 varying from distinctly more to a little less than three times as long as broad; vertex with much more numerous punctures, though they are still fine and rather sparse. Pronotum not quite twice as broad as long, entirely or at least the anterior half rugosely punctured; mesonotum with notaulices longer, extending over three-quarters its length, and usually with two small impressed lines between them anteriorly; metanotum sometimes smooth; mesopleuron anteriorly rather more shining and less closely punctured; metapleuron smoother; propodeum with dorsal and posterior areas quite continuous. Fore legs with tarsal segment 5 bearing up to 24 small lamellae, while the distal group may consist of as many as 7 or 8. Fore-wings with radial vein usually slightly angled.

♂. Structurally very close to *P. daos* (Walk.): Larger, length 2·0–3·4 mm., average 2·65 mm. (only 14 specimens out of 49 are shorter than 2·5 mm.); antennae thicker, proportions of segments about the same, but becoming rather longer in large specimens; vertex usually more strongly and closely punctured; dorso-posterior part of the mesopleuron more or less coarsely rugose, rarely partly smooth. Genitalia fig. 48.

This species may be divided into five varieties in the female. I have not been able, in the material available, to find sufficient discontinuity to recognise separate species, nor is it possible in all specimens to be sure to which variety they belong. Specimens of the typical variety (*ruficornis* (Dalm.) = *procericornis* (Kieff.)) are listed below ♀♀:—

Type of *Anteon procericornis* Kieffer, Scotland, Sutherland (*P. Cameron*) (B.M.); Yorks North East, Lastingham (F.); Herts, Aldbury, 2 ex. 15.vi.1936 (*R. B. Benson*) (B.M.); Kent East, Faversham district (*A. J. Chitty*) (M.); Staffs, Burnt Wood, 11.vi.1932 (*H. Britten*) (B.); Scotland, Sutherland South, Bonar Bridge (*P. Cameron*) (B.M.) (determined as *Anteon rectus* Kieff.); Lanark, Possil (*P. Cameron*) (B.M.) (determined as *A. rectus*); Ireland, Kildare, Glending, 10.vi.1933 (*J. F. Perkins*) (A.W.S.); Carlow, Bahanna Wood, 2 ex. 9.vi.1935 (*A.W.S.*); Wicklow, Bally Smutton, in trout's stomach, 23.viii.1936 (*A.W.S.*); "England," 2 ex. (*A. H. Haliday*) (D.); "British," 1 ex. (*A. H. Haliday*) (D.); no data, 1 ex. (H.D.), 2 ex. (Haliday coll.) (D.).

Also the type of *Gonatopus ruficornis* Dalman kindly sent from Stockholm by Dr. A. Roman.

This variety is connected to var. *longicornis* (Dalm.) by intermediates. The colour of the antennae varied as follows: entirely yellow, 4; yellow with 3–4 brown, 4; yellow with 3–5 brown, 3; yellow with 3–6 brown, 1; yellow with 3–10 brownish, 1.

Prenanteon ruficornis var. *longicornis* (Dalman).

(= *crassimanus* (Hal. *in* Curt.) = *crassiscapus* (Kieff.) = *pallidinervis* (Kieff.) = *dolichocerus* (Kieff.) = *halidayi* (Kieff.).

Differs from the typical form as follows: clypeus yellow or reddish-yellow, more rarely pitchy-red; sometimes a small reddish spot above clypeus between antennal sockets. Very rarely hind femora have a small black distal patch; hind coxae black proximally to a variable extent (always less than half). Pronotum with anterior half closely punctured rather than rugose, posterior half smooth and shining, with or without a few large punctures.

Specimens examined ♀♀: types of *Dryinus crassimanus* Hal. *in* Curt. and *Anteon halidayi* Kieff., Ireland, Down, Holywood (*see* Richards, 1935: 153–154); Yorks North East, Whitby, 13. and 20.viii.1897 (*A. Beaumont*) (M.); Staffs, Madeley, 8.vi.1938 (*H. W. Daltry*); Suffolk East, Monks Soham, 24.viii.1909 (M.); Cambs, 2 ex. (H.W.); Gloster West, Wotton-under-Edge,

1907 (*R. C. L. Perkins*) (B.M.); Oxford, 1.vii.1906 (*A. J. Chitty*) (M.); Bucks, Slough, on grass, 8.viii.1936 (*O.W.R.*); Denbigh, Colwyn Bay, 28.viii.1891 (*A. Beaumont*) (M.); Anglesea (H.D.); Stirling?, "Killingdock" (*P. Cameron*) (B.M.) (type of *Anteon pallidinervis* Kieff.); Dumbarton, Thornhill (*P. Cameron*) (B.M.); Ireland, Down, Furry Glen, 20.viii.1936 (*A.W.S.*); "British," 4 ex. (*A. H. Haliday*) (D.); no data, 2 ex. (Desvignes coll.) (B.M.), 1 ex. (Stephens coll.) (B.M.) (labelled *Dryinus flavicornis*), 1 ex. (*A. Piffard*) (M.), 2 ex. (H.D.). Further the type of *Dryinus longicornis* Dalman kindly sent from Stockholm by Dr. A. Roman.

At Paris I examined the type ♀ of *A. crassiscapus* Kieff., Dieppe (*de Gaulle*) and of *A. dolichocerus* Kieff., Sèvres, 2.viii.1891 (*de Gaulle*) and a ♀ no data (*Giraud*). Mr. J. F. Perkins kindly examined the type of *Dryinus retusus* Thomson, 1860 at Stockholm. It is a *Prenanteon* and from the description is probably a synonym of the var. *longicornis* (Dalm.).

The variation in the colour of the antennae is as follows: Antennae entirely yellow, 8; antennae yellow with 3–6 or 7 darker, 9; antennae brown with 1–2 paler, 2; antennae brown, 1.

Prenanteon ruficornis var. *melanocera* (Kieffer).

(= *declivis* (Kieff.)).

Differs from the typical form as follows: antennae of about the same length and proportions in specimens of equal size, blackish-brown, 1–2 yellow, 3 a little paler proximally or pale brown and 4 paler proximally, last three or four segments a little paler beneath; sculpture of pronotum as in var. *longicornis* (Dalm.); hind coxae almost entirely yellow, but distal part of hind femora more or less black, especially dorsally. Pterostigma rather darker.

Specimens examined ♀♀: Scotland, Stirling, Mugdock (*P. Cameron*) (B.M.) (type of *A. melanocera* Kieff.); Lanark, Clydesdale (*P. Cameron*) (B.M.) (type of *A. declivis* Kieff.); Ebudes North, Skye, vii.1933 (*Miss E. B. Tunbridge*) (Ca.) (antennae black, even segment 1 brown); Dorset, Studland, marram dunes, 1 ex. 4.vii., 6 ex. 19.vii., 5 ex. 27.vii.1938 (*O.W.R.*); Flint, Point of Ayr, 29.viii.1922 (*A. Dixon*) (B.M.); Ireland, Sligo, Streedagh, 7.viii.1923 (*A.W.S.*).

Prenanteon ruficornis var. *basalis* (Dalman)

(= *luteipes* (Kieff.) = *walkeri* (Kieff.)).

Differs from the typical form as follows: antennae rather shorter, penultimate segments less than three times as long as broad, antennae black, 1–2 sharply yellow; hind coxae often entirely yellow; hind femora distally more or less darkened above. Pterostigma darker.

Specimens examined ♀♀: Type of *Chelogynus walkeri* Kieffer, Ireland, Down, Holywood (*A. H. Haliday*) (D.) (*see* Richards, 1935 : 154); Norfolk East, Catfield, 11.viii.1920 (*J. J. F. X. King*) (G.); Dorset, Glanvilles Wootton, vii.1892 (H.D.); Somerset North, Shapwick, 12.vii.1933, on flowers *Heracleum* (M.); Ireland, Sligo, Streedagh, 27.vii.1933 (*A.W.S.*) (specimen with wings a little narrowed and shortened); Scotland, Inverness East, Kingussie, viii.1912 (*E. A. Elliott*) (M.) (mesonotum reduced; wings shortened and narrowed, reaching to posterior margin of tergite 1; venation complete but pterostigma very narrow); Dumfries, Nutberry, 22.vii.1936 (*J. Murray*); "British" (Haliday) (D.).

Mr. J. F. Perkins kindly examined the type of *Gonatopus basalis* Dalman, 1818, at Stockholm. Mons. L. Berland compared a specimen for me with type of *Anteon luteipes* Kieff. (*see* Richards, *loc. cit.* : 154).

I have re-examined this type (France, Meudon, 21.vi.1888 (*de Gaulle*) (P.)) myself. It resembles my var. *luteipes* in colour, but the proportions of the antennal segments are intermediate between it and var. *melanocera* (Kieff.), the coxae are entirely yellow and the pronotum is punctured throughout. The tendency to shortening of the wings in this variety provides a bridge to var. *subapterus* (Kieff.), in which the reduction is carried much further. The shorter antennal segments seemed at first to mark var. *luteipes* (Kieff.) out as a distinct species, but on examining a considerable series, the proportions of the segments vary so much, especially in relation to the size of the specimen, that no really discontinuous form seems to exist.

Prenanteon ruficornis var. *subapterus* (Kieff).

Differs from the typical form as follows : antennae a little shorter, segments about as in var. *basalis* (Dalm.), colour yellow-brown, segments 1–3 a little lighter; pronotum coarsely rugose and surface somewhat irregular, with a very narrow posterior smooth strip; mesonotum shorter than pronotum, nearly twice as broad as long, scutellum also reduced; hind femora distally darkened, hind coxae proximally narrowly dark; wings very short, fore-wings only reaching back a short distance behind the metanotum, twice as long as broad, distally rounded, with two longitudinal veins; hind-wings of about same length.

Specimens examined ♀♀ : Scotland, Inverness East, Aviemore (*P. Cameron*) (B.M.) (type of *A. subapterus* Kieff.); Staffs, Lichfield (*L. A. Carr*) (H.W.) (antennae entirely yellow; det. by Dr. O. Schmiedeknecht as *Gonatopus pedestris*, *see* Carr, 1931), Hawksmoor, 14.vi.1933 (*H. Britten*) (B.) (antennae yellow, pronotum less rugose, hind coxae mainly yellow, fore-wings longer, more pointed, about three times as long as broad); Cambs, Wicken sedge Fen, 8.vii.1924 (*G. L. R. Hancock*) (B.M.) (antennae yellow, wings pointed, three times as long as broad, hind coxae yellow); Dumfries, Gretna, Corrie, 29.vi.1931 (*J. Murray*) (M.) (antennae yellow, hind coxae almost entirely yellow).

I can see no good reason to separate this variety specifically from *P. ruficornis* (Dalm.), still less to place it in a distinct genus (*Mystrophorus* Först.).

The male of *P. ruficornis* (Dalm.) is divisible into two, not clearly separated, varieties which seem to have no special relation to the varieties of the female.

Prenanteon ruficornis (Dalman).

Typical form (= *fuscicornis* (Dalm.) = *ilus* (Walk.) = *misor* (Walk.) = *pyrenaicus* (Kieff.) = *hyalinipennis* (Kieff.) = *luffnessensis* (Chitty)).

Antennal segment 1 more or less brown, legs yellow; coxae distally sometimes partly black; hind femora sometimes a little darkened distally, mid and hind femora sometimes more or less brown beneath proximally; mandibles with greater part yellow; length 2·2–3·0 mm., average 2·56 mm.

Specimens examined ♂♂ : " Britain " 2 ex. (Walker coll.) (B.M.) (types of *Dryinus ilus* and *D. misor* Walk., *cf.* Richards, 1935 : 155); Britain (Walker coll.) (B.M.) (paratype of *D. ilus* Walk.); " Norfolk," 17.viii.1908 (M.); Norfolk East, Catfield, 2 ex. 7.vii.1920 (*J. J. F. X. King*) (G.); Suffolk West, Tuddenham Fen, 6.viii.1913 (M.); Surrey, Oxshott, 22.vii.1934 (*J. F. Perkins*) (B.M.) and 9.viii.1930 (*G. E. J. Nixon*); Hants South, New Forest, Fidley Green,

23.vi.1934 (M.); Dorset, Studland, marram dunes, 28.vii.1938 (*O.W.R.*); Scotland, Moray, Rookby,[18] 1.viii.1907 (M.); Argyll, Kirr, 21.vii.1925 (*J. J. F. X. King*) (G.); Kirkcudbright, Dalry, 2 ex. (*P. Cameron*) (B.M.) (one the type of *Anteon hyalinipennis* Kieff.); Dumfries, Nutberry, 22.vii.1936 (*J. Murray*); ? Scotland (*P. Cameron*) (B.M.); Ireland, Leitrim, Bundoran district, Kinlough, 26.vii.1933 (*A.W.S.*); Dublin, the Slade of Saggart, 12.viii.1936 (*A.W.S.*); Wicklow, Athdown, 1 ex., 30.vii.1936, 2 ex., 1.viii.1937, Coan, Glen of Imael, 25.vi.1933 (*A.W.S.*); Wexford, Curracloe, 20.vii.1937 (*A.W.S.*), Edenvale, 25.vii.1937 (*A.W.S.*); Kerry South, R. Coosane, 11.vii.1935 (*A.W.S.*); Cork West, Glengariff, Roche's Glen, 19. and 26.vii.1935 (*A.W.S.*); Mayo West, Louisburgh (M.); " British " 7 ex. (*A. H. Haliday*) (D.), 2 ex. 14. and 26.vii. (*J. J. F. X. King*) (G.); no data 1 ex. (H.D.).

Also France, Ax-les-Thermes, vii.1904 (*de Gaulle*) (P.) (type of *Anteon pyrenaicus* Kieff.), Mesnil-le-Roi (P.), Maisons-Lafitte, 5.vii. (*de Gaulle*) (P.); Germany, 2 ex. Aachen (*Förster*) (♀) (labelled " *nitidulus* Förster ").

Mr. J. F. Perkins kindly reported on the type of *Gonatopus fuscicornis* Dalman at Stockholm.

Prenanteon ruficornis var. *fractinervis* (Kieffer)

(= *parvicollis* (Kieff.) = *parcepunctatus* (Kieff.) = *morleyi* (Chitty)).

Differs from the typical form as follows: antennal segment 1 black; coxae all black (rarely a little yellow distally in paler specimens); rest of fore leg yellow, femora more or less brown proximally, especially beneath; mid legs yellow to yellow-brown with major proximal part of femora dark brown; hind legs brown, tibiae and tarsi lighter; mandibles black, distally more or less red, less commonly yellow. Length 2·0–3·4 mm., average 2·70 mm.

Specimens examined ♂♂: Scotland, Stirling, Clober, 2 ex. (*P. Cameron*) (B.M.) (types of *Anteon fractinervis* Kieff. and *P. pyrenaicus* var. *parcepunctatus* Kieff.); Suffolk East, Monks Soham, 30.vii.1915 (M.), Foxhall, 10.viii.1902 (M.) (type of *Antaeon morleyi* Chitty), Henstead Marsh, 3.vii.1906 (M.); Herts, Brickett Wood, 28.v.1937, Boxmoor, 21.vi.1937 (*R. B. Benson*) (B.M.); London, Shoreditch, 13.viii.1919 (*J. J. F. X. King*) (G.); Hants South, Brockenhurst, 3, 25–30.vi.1933 (*G. E. J. Nixon*), 18.vii., 2, 19.vii., 23.vii.1924 (*J. J. F. X. King*) (G.); Devon North, Barnstaple, 5 (F.); Scotland, Inverness East, Nethy Bridge, 8. and 14.vii.1922 (*J. J. F. X. King*) (G.), Nairn, Darnaway Forest, 5.vi.1934 (*R. B. & J. E. Benson*) (B.M.); Perth North, Rannoch, 18. and 22.vii., 1.viii.1917 (*J. J. F. X. King*) (G.); Lanark, Cadder (*P. Cameron*) (B.M.) (identified as *Anteon parvicollis* Kieff.); Dumfries, Gretna, 5.viii.1936 (*J. Murray*); Ireland, Donegal East, Bundoran district, Gubacreazy, 6.viii.1933 (*A.W.S.*); Leitrim, Tullaghan, 10.vii.1936 and 3 ex. 12.vii.1936 (*A.W.S.*); Sligo, Bunduff, 1.viii.1933 (*A.W.S.*), Trawalua, 3 ex. 24–29.vii.1933 (*G. E. J. Nixon*); Dublin, Glenasmole, 25.v.1937 (*A.W.S.*), the Slade of Saggart, 22.vii.1936 (*A.W.S.*), Saggart, 2 ex. 5.vi.1935 (*A.W.S.*); Wicklow, Deputy's Pass, 14.v.1933 and 24.vii.1929 (*A.W.S.*), Clara, 27.v.1934 (*A.W.S.*); Wexford, Ballyteige, 28.vii.1937, Ferrycarrig, 26.vii.1929 (*A.W.S.*); Mayo West, Clare Is., vii.1910 (M.); no data, 1 ex. (Stephens coll.) (B.M.), 5 ex. (H.D.); " British" 1 ex. (*Haliday*) (D.), and 26.vii. (*J. J. F. X. King.*) (G).

Also France, Maisons-Lafitte, vi. (*de Gaulle*) (P.); Austria, no data 2 ex. (*Giraud*) (P.), Reichenau (*Giraud*) (P.), Wien, Prater, 8.vi. (*Giraud*) (P.).

[18] This locality is dubious as the label is not very legible.

I am strongly of the opinion that the "typical" males described above (=*fuscicornis* (Dalman)) and the var. *fractinervis* (Kieff.) correspond to the females of *P. ruficornis* (Dalm.), but I have kept the records separate. There is no absolute line of division between the so-called typical males and var. *fractinervis* (Kieff.), but most specimens can be assigned to one or the other without being very arbitrary. The males of *P. daos* (Walk.) (*q.v.*) are rather more distinct, but again intermediate specimens are sometimes found. I have used the varietal name *fractinervis* instead of *parvicollis* which has page priority because the type of the latter has not been examined (Richards, 1936a).

Prenanteon frontalis (Dalman).

Gonatopus frontalis Dalman, 1818.

♀. Black; palps, mandibles, segment 1 of antennae, clypeus, areas between clypeus and eyes, large rectangular area above antennae extending posteriorly half-way to anterior ocellus and laterally as far as outer margin of antennal sockets, and legs yellow; antennal segment 2 brown; tegulae testaceous, wings hyaline, pterostigma and venation pale brown. Surface of body (except abdomen) with moderately numerous pale hairs, denser on face. Length 2·3 mm.

Structurally similar to *P. daos* (Walk.) except in the following particulars: antennae moderately long and thin, segment 1 cylindrical, as long as 3, two and a half times as long as broad, 2 pyriform, twice as long as broad, much shorter than 9, 3 a little shorter than 4, as long as 5, three and a half times as long as broad, 4–9 progressively shorter, 4 four times, 9 three times as long as broad, 10 as long as 4. Vertex considerably more strongly and closely punctured; posterior side of ocellar triangle considerably longer than other sides, lateral margins of head behind the eyes shorter than OOL, posterior ocelli removed from occiput by hardly more than half the POL. Scutellum punctured; mesopleuron more strongly rugose; propodeum with posterior face more vertical, forming a more definite angle with dorsal face which is less than half its length.

Specimens examined ♀♀: Hants South, New Forest, Matley Bog, 6.vii.1909 (M.). Also the type of *Gonatopus frontalis* Dalman, kindly sent from Stockholm by Dr. A. Roman.

This species seems quite distinct not only in colour but in the structure of the propodeum. 3 ♀♀ (2 coll. Sichel—one from Aix-la-Chapelle—and 1 coll. Fairmaire) (P.) seem to belong to the same species; the markings of the head are white not yellow and the dorsal limit of the white extends from eye to eye in a gentle curve, not appearing as a central rectangle.

Anteon Jurine, 1807.

Second sector of radial vein in fore-wing (fig. 73) never as long as first sector, nearly always very much shorter (cf. *A.* (*C.*) *lucidum* (Hal. *in* Curt.) (p. 270).

Genotype (only species placed in genus when species first cited) = *A. jurineanum* Latreille, 1809.

Synonyms: *Prosanteon* Perkins, 1905. Genotype (genus monobasic) = *P. chelogynoides* Perkins, 1905; *Xenanteon* Kieffer, 1913a. Genotype here fixed as *Anteon reticulatus* Kieffer, 1905 = *Xenanteon reticulatus* (Kieffer, 1913a). **Syn. n.**

Subgenera :—

Anteon Jurine *s.s.*

♀. Pronotum transverse. Segment 4 of fore tarsi (fig. 50) much shorter than 1; segment 5 with the free part usually quite short, with only a distal group of lamellae.

The subgenus is known from Europe, U.S.A., Seychelles, Australia.

Chelogynus Haliday, 1838.

Pronotum usually quadrate (except group of *A.* (*C.*) *infectum* (Hal. *in* Walk.)). Segment 4 of fore tarsi (fig. 69) at least two-thirds as long as 1; segment 5 with the free part long, with both a proximal row (or rows) and a distal group of lamellae.

Genotype (fixed by Kieffer, 1914) = *Chelogynus gaullei* (Kieffer) = *Anteon gaullei* Kieffer, 1905 = *Dryinus collaris* Walker, 1837 *nec* Dalman, 1823.

Synonyms: *Neochelogynus* Perkins, 1905. Genotype here fixed as *N. typicus* Perkins, 1905; *Allanteon* Kieffer, 1914. Genotype (genus monobasic) = *Anteon punctatus* Kieffer, 1905 = *A.* (*C.*) *luteicorne* Kieffer, 1905. The subgenus is known from Europe, U.S.A., C. America, Australia and S. Africa.

The genotype of *Anteon*, *A. jurineanum* Latreille, is a very insufficiently described species, but I have retained the name, partly for the reasons given on p. 257, where the species is described, and partly because of the inconvenience of having an important genus with a completely unrecognisable genotype.

The subgenus *Chelogynus* has in recent years usually been treated as a separate genus since it was revived by Perkins (1905 : 60) as *Neochelogynus*, later (1907 : 48) as *Chelogynus*. If one were concerned only with the female sex there would be much to be said for treating *Chelogynus* as a genus, particularly if the name *Allanteon* Kieff. was retained for the group of *A.* (*C.*) *infectum* (Hal. *in* Walk.). But, in spite of the most careful study, I have been unable to find any character by which the males can be separated into corresponding groups. In one case (*A. jurineanum* Latr. and *A.* (*C.*) *fulviventre* (Hal. *in* Curt.)), it is not always easy to separate specifically the males which belong one to one and one to the other of these supposed genera. Moreover, such species as *A.* (*C.*) *rufulocolle* Chitty provide an intermediate type of structure even in the female sex. Probably *Lasianteon* Kieffer, 1913, should also be treated as a synonym of *Anteon* Jurine, though I have not examined specimens of it. *Lasianteon*, defined by its hairy eyes, probably intergrades with *Chelogynus* in which such species as *A.* (*C.*) *fulviventre* (Hal. *in* Curt.) have a distinct though very short pubescence on the eyes.

The name of the genus *Anteon* has usually been treated as of masculine gender, but Latreille, who first placed a species in the genus, gave *A. jurineanum* a neuter termination.

On a recent visit to Stockholm, Mr. J. F. Perkins kindly examined the type of *Dryinus facialis* Thomson, 1860. It is a *Chelogynus* with the pronotum as long as broad. It is probably distinct from any species described in the present paper. The types of the following species should be in the Paris Museum but cannot now be traced : *A. tridentatus* Kieffer, 1914, *A. punctulatus* Kieffer, 1905, *A. nitidus* Kieffer, 1905, *A. albicoxis* Kieffer, 1905, *A. neglectus* Kieffer, 1914, *A. sericeus* Kieffer, 1905. Mr. J. F. Perkins tells me that the type of *Gonatopus pubicornis* Dalman, 1818, is an *Anteon s.l.* ♂, but it is in too bad condition to determine.

Anteon brevicornis (Dalman).

♀ *Gonatopus brevicornis* Dalman, 1818.
♀ *Dryinus cursor* Haliday *in* Curtis, 1838. **syn. n.**
♂ *D. otiartes* Walker, 1837 : 425. **syn. n.**
♀ *D. sisithrus* Walker, 1837 : 426. **syn. n.**
♂ *D. nanus* Haliday *in* Walker, 1837 : 427. **syn. n.**
♀ *Anteon crenulatus* Kieffer, 1905 : 141. **syn. n.**
♀ *A. thomsoni* Kieffer, 1905 : 142. **syn. n.**
♀ *A. vicinus* Kieffer, 1905 : 145. **syn. n.**
♀ *A. rectus* Kieffer, 1905 : 171. **syn. n.**
♂ *A. scoticus* Kieffer, 1905 : 174. **syn. n.**
♂ *Antaeon barbatus* Chitty, 1908. **syn. n.**
♀ *Chelogynus brevicornis* Kieffer, 1914. **syn. n.**
♀ *Xenanteon brunneipes* Berland, 1928. **syn. n.**

♀. Black; palps, mandibles yellow; antennal segments 1–2 sometimes brownish or very rarely yellowish; legs light brown, sometimes almost yellow, sometimes quite dark, femora darker, tibiae and tarsi often paler; tegulae testaceous. Wings hyaline, venation yellowish, pterostigma brown with a pale proximal spot. Surface of body (except abdomen) with moderately numerous, rather long, pale, outstanding hairs. Length 2·0–3·0 mm.

Eyes with very few microscopical hairs; head, in dorsal view (including eyes), more than twice as broad as long, vertex between eyes more than one and a half times as broad as long, sides parallel in front, posteriorly with a rather weakly curved raised margin, anterior side of which is distinctly crenate; antennae rather short and distinctly thickened, segment 1 with distal half a little thickened, hardly curved, longer than 2 + 3, shorter than 2 + 3 + 4, five times as long as broad, 2 weakly pyriform, a little longer than 4, two and a half times as long as broad, 3–9 gradually decreasing in length and increasing in thickness, 3 nearly three times, 9 one and one-third times as long as broad, 10 longer than 3, two and a half times as long as broad; vertex dull, densely alutaceous with a more or less distinct pattern of irregular raised lines, rarely these raised rugosities are very much reduced; lateral and central keels usually quite distinct; curved impressions at sides of posterior ocelli obsolete; ocellar triangle with posterior side normally half as long again as one of the other two sides, POL : OOL as 1 : 1, lateral margins of head behind eyes two-thirds as long as OOL, posterior ocelli removed from occiput by less than half POL. Pronotum very short, more than twice as broad as long, finely rugose with a narrow posterior strip smooth; mesonotum moderately shining, weakly alutaceous, anterior third weakly rugose, notaulices weak and very short; scutellum flat, shining, unsculptured, posterior crenate furrow distinct; metanotum ("postscutellum") with large central area shining, nearly smooth; mesopleuron anteriorly dull, finely and closely rugose, postero-ventrally smooth and shining, with a few raised rugosities; metapleuron dull, weakly rugose; propodeum with dorsal and posterior surfaces clearly separated by a bisinuate keel the lateral extremities of which are not very prominent, dorsal rather less than half as long as posterior surface, dorsal surface strongly clathrate, posterior surface more finely clathrate, shining. Abdomen bare and shining. Fore legs (fig. 50) with basitarsus distinctly longer than segments 2–4 together, 2 transverse, 3 and 4 a little longer than broad, 4 produced laterally, articulating part of segment 5 (figs. 51–2) as long as 1, its distal angle a more or less sharp right angle, free part of 5 consisting only of a small curved piece, as long as 4, 5 with 1–2 long distal lamellae, 4 lamella-like bristles, 15 ordinary bristles; enlarged claw strongly curved. Radial vein in fore-wings with distal section about one-third as long as proximal.

♂. Closely resembles the female, except in the following particulars: size usually rather smaller; antennae of moderate length, rather thick but tapering distally, segments with dense outstanding pubescence as long as their diameters, segment 1 nearly cylindrical, a little curved, as long as 2 + 3, three and a half times as long as broad, 2 pyriform, a little shorter than 3, two and a half times as long as broad, 3 a little shorter than 4, not quite three

times as long as broad, 4–9 of about the same length but gradually decreasing in thickness, 4 three times, 9 three and a half times as long as broad, 10 as long as 1, five times as long as broad; posterior ocelli removed from occiput by very little more than their diameter; posterior surface of propodeum often more finely sculptured; fore legs simple; abdomen with ninth sternite and genitalia (fig. 53) not essentially different from *A. brachycerum* (Dalm.).

Specimens examined :—77 ♂♂ and 76 ♀♀ including the following types : ♀ type [19] *Dryinus cursor* Hal. *in* Curt. (Curtis coll., Melbourne); ♂ type of

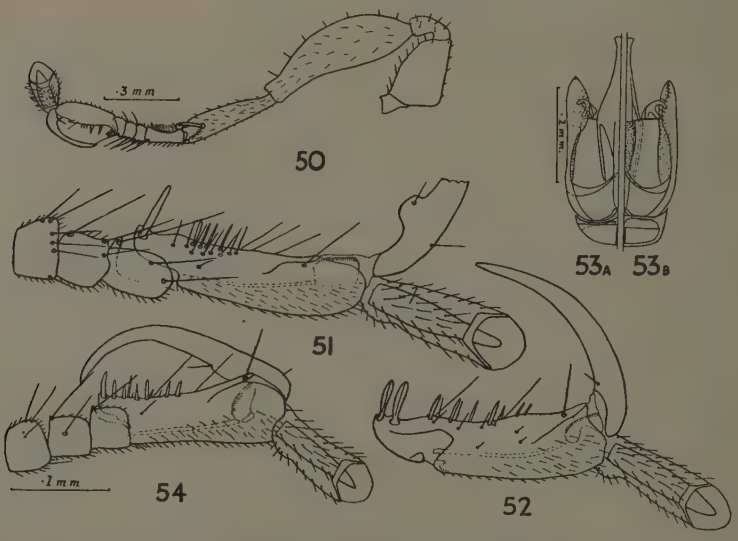


Fig. 50.—Fore leg of *Anteon* (*A.*) *brevicorne* (Dalm.) ♀.
Fig. 51.—Same species (type ♀ of *Dryinus cursor* Hal. *in* Curt.), chela and tarsal segments 2–4.
Fig. 52.—Same species (smaller ♀), chela.
Fig. 53.—Same species, ♂ genitalia, (a) dorsal, (b) ventral view.
Fig. 54.—Chela and tarsal segments 2–4 of *Anteon* (*A.*) *marginatum* Kieff. ♀.

Dryinus otiartes Walker and ♀ type of *D. sisithrus* Walker (Walker coll., B.M.) (*see* Richards, 1935 : 147–8 and Richards, 1936a); Sutherland South, Bonar Bridge ♀ (*P. Cameron*) (B.M.) (type of *Anteon crenulatum* Kieff.); Sutherland ♂ (*P. Cameron*) (B.M.) (type of *A. scoticum* Kieff.); Dumfries 2 ♀♀ (*P. Cameron*) (B.M.) (types of *A. vicinum* Kieff. and *A. rectum* Kieff.); Suffolk East, nr. Ipswich, Bentley Wood, ♂, 25.v.1902 (*A. J. Chitty*) (M.) (type of *Antaeon barbatum* Chitty).

I have seen British specimens from the following vice-counties : Westmorland, Derby, Staffs, Suffolk East and West, Bucks, Herts, London, Kent West and East, Surrey, Hants South, Dorset, Somerset North and South, Devon

[19] There is a supposed type of *Dryinus cursor* in Haliday's collection at Dublin (*see* Richards, 1935 : 149) and this is a specimen of the species described on p. 250 as *A. marginatum* Kieff. According to Curtis' description (1828 : plate 206), the specimen in his collection (not Haliday's) must be regarded as the type.

South; Scotland, Sutherland South, Ross West, Inverness East, Moray, Argyll, Stirling, Dumfries; Ireland, West Meath, Wicklow, Cavan.

The following continental material has been examined: France, Fontainebleau, ♂, 19.iv.1897 (*de Gaulle*) (P.), Maisons-Lafitte, ♂, 3.v.1896, ♀, 17.v. (*de Gaulle*) (P.) (♀ type of *Xenanteon brunneipes* Berland), ♀ " hortage " 10.v.1874 (*Fairmaire*) (P.), no data ♀ (*de Gaulle*) (P.); Austria, ♀ (*Giraud*) (P.).

Mr. J. F. Perkins kindly examined the type ♀ of *Gonatopus brevicornis* Dalman, 1818, at Stockholm and confirmed my suppositions as to its identity. *Anteon thomsoni* Kieffer was founded on Thomson's specimens of *Dryinus brevicornis* which Kieffer thought Thomson had misidentified. Dr. A. Roman kindly sent me a ♂ and ♀ from Thomson's collection, and they are clearly the same as *A. brevicorne* (Dalm.), though the sculpture of the head of the female is less coarse than usual.

Curtis' type of *Dryinus cursor* is a rather large specimen and it was at first thought that it belonged to a species different from the smaller specimens. There are so many intermediates, however, that this is clearly not the case. The species is known by the coarse sculpture of the head (the details of the sculpture being very variable) and the truncate propodeum of which the posterior face is well defined above and without a central area.

A. marginatum Kieff., which is very close to it, has less coarse sculpture on the vertex (this character just overlapping), the scutellum less brightly shining, the upper definition of the propodeum even stronger, and the posterior surface more finely sculptured. There is also a difference in the shape of the ocellar triangle (posterior side broader in *A. brevicorne*) but this is also subject to some variation. Usually the antennae of *A. brevicorne* are dark with at most one or two proximal segments brown, but there is one specimen (♀ no data (H.D.)) in which the antennae have segments 1–4 entirely and 5–10 beneath yellow and the legs yellow-brown. In *A. marginatum* the antennae are always yellow proximally and the legs are also a purer yellow. There appears to be no absolute discontinuity between these two species.

The dates of capture of the British specimens are as follows :—

Month:	April		May				June				July	
Date:	15–21	22–28	29–5	6–12	13–19	20–26	27–2	3–10	11–17	18–24	25–1	2–8
No. of ♂♂ .	1	2	2	1	10	15	15	6	1	1	1	0
No. of ♀♀ .	0	0	0	1	0	8	15	12	4	1	4	2

A. brevicorne is chiefly found on the leaves of trees such as beech, birch, dogwood, etc. It is apparently less often captured by sweeping herbage. The host is unknown.

Anteon marginatus Kieffer.

A. marginatus Kieffer, 1905 : 147.
A. cursor Richards, 1935 : 149 *nec Dryinus cursor* Haliday *in* Curtis, 1828.

♀. Black; palps, mandibles, segments 1–2 of antennae, legs and tegulae yellow. Antennal segments 3–4 more or less brown. Hind coxae more or less darkened proximally; hind femora sometimes brown tinged. Wings hyaline, venation yellowish, pterostigma and radial vein brown, the former with a pale proximal spot. Surface of body (except abdomen) with moderately numerous, rather long, pale, outstanding hairs. Length 2·0–2·7 mm.

Structurally very close to *A. brevicorne* (Dalm.) but differing as follows: antennae segment 2 hardly longer than 4, twice as long as broad; vertex absolutely dull, densely alutaceous, with a few ill-defined, large, shallow punctures, not rugose or only very feebly so; lateral keels obsolete, central keel distinct; ocellar triangle usually quite or nearly equilateral, posterior ocelli removed from occiput by half the POL or rather more. Pronotum more coarsely rugose; mesonotum duller, more closely alutaceous with a larger anterior rugose area; scutellum more or less alutaceous, at any rate on a line down the centre; mesopleuron more coarsely rugose, even postero-ventrally; metapleuron rather strongly striate; propodeum with lateral extremities of keel separating dorsal and posterior surfaces more prominent, dorsal surface more strongly clathrate, three or four nearly smooth areas of some size being often defined, posterior surface more finely sculptured, duller, granulate rather than rugose, at any rate on disc. Fore legs with articulating part of segment 5 (fig. 54) a little shorter than 1, with one long distal lamella, about 8 lamelliform bristles, 6 ordinary bristles.

♂. Very close to *A. brevicorne* (Dalm.), differing as follows: antennae brownish, shorter and thicker; segment 1 three times, 2 twice, 3 two and a half times as long as broad; 4–9 tapering less, neither 4 nor 9 quite three times as long as broad. Sculpture differing as in female, but differences less pronounced. Legs pale brown, fore tibiae and tarsi paler.

Specimens examined: Suffolk East, Oulton Broad, ♀, 16.vi.1922 (M.); no data, ♀ (H.W.), ♂♀ (H.D.), ♂, 5 ♀♀ (Stephens coll.) (B.M.).

The Stephens' specimens were labelled *Gonatopus basalis* but they clearly do not belong to Dalman's species of that name. I have recognised Kieffer's species from the description.

Anteon brachycerum (Dalman).

♀ *Dryinus brachycerus* Dalman, 1823.
♀ *D. lyde* Walker, 1837. **syn. n.**
♀ *Anteon nigricornis* Kieffer, 1905 : 172. **syn. n.**
♀ *A. triareolatus* Kieffer, 1905 : 175. **syn. n.**
♀ *A. brevicollis* Kieffer, 1905 : 176. **syn. n.**
♀ *A. flavitarsis* Kieffer, 1905 : 176. **syn. n.**
♂ *A. indivisus* Kieffer, 1905 : 199. **syn. n.**
♂ *A. nigroclavatus* Kieffer, 1905 : 205. **syn. n.**
♀ *A. curvatus* Kieffer, 1906 : 517. **syn. n.**
♀ *A. obscuricornis* Kieffer, 1906 : 523. **syn. n.**
♂ *Antaeon suffolciensis* Chitty, 1908. **syn. n.**
♀ *Anteon curvus* Kieffer, 1914. **syn. n.**

♀. Black; palps, greater part of mandibles, trochanter, anterior side and small distal area of femora, tibiae and tarsi in fore legs, trochanters, junction of femora and tibia in four hind legs, and tegulae testaceous; rest of four hind tibiae and their tarsi brown. Wings hyaline, pterostigma and venation pale yellow. Surface of body (except abdomen) with rather sparse, outstanding, pale hairs. Length 2·3–3·3 mm.

Eyes with a few very short hairs; head, in dorsal view (including eyes), rather more than twice as broad as long, vertex between eyes half as broad again as long, sides parallel in front, posteriorly with a weakly curved raised margin anterior side of which is very weakly crenate; antennae rather short and thick, segment 1 with the distal half considerably thicker than the proximal, hardly curved, as long as 2 + 3, three and a half times as long as broad, 2 a little pyriform, twice as long as broad, a little shorter than 3, as long as 4, 3–9 decreasing gradually in length, and increasing very gradually in thickness, 3 two and a half times, 9 not quite one and a half times as long as broad, 10 a little longer than 3, two and a half times as long as broad; vertex dull, finely alutaceous especially at sides, with central half clearly more shining and less alutaceous, whole finely and rather closely punctured; lateral and central keels obsolete; curved impressions at sides of posterior ocelli obsolete;

ocellar triangle with posterior side fully half as long again as one of other two sides, POL : OOL as 4 : 5, lateral margins of head behind eyes hardly two-thirds as long as OOL, posterior ocelli removed from occiput by less than half the POL. Pronotum very short, more than twice as broad as long, closely punctured with a narrow posterior strip smooth; mesonotum shining, finely and rather closely punctured, notaulices hardly developed; scutellum flat, shining, finely punctured, posterior crenate furrow weak; metanotum (" postscutellum ") with a large central area smooth and shining; mesopleuron smooth and shining, anteriorly very little punctured, postero-dorsally hardly rugose; metapleuron shining, hardly punctured; propodeum with dorsal and posterior surfaces moderately clearly separated, former nearly half as long as latter, posterior surface with a rather well-defined area with its sides diverging a little upwards and top (anterior end) rounded, surface rather strongly and irregularly rugose, within area distinctly less strongly, area therefore rather more shining, sometimes markedly so. Abdomen bare and shining. Fore legs with basitarsus a little longer than segments 2–4 together, 2–4 about quadrate, 3 with a large inner (anterior) process, articulating part of segment 5 (fig. 55) nearly as long as 2–4 together, its distal angle rounded, free part consisting only of a small curved piece, hardly longer than segment 4, segment 5 with about 13 bristles and a distal group of 4 lamellae, enlarged claw strongly curved. Radial vein in fore-wings with distal section about one-third as long as proximal.

♂. Closely resembles the female except in the following particulars: pterostigma dark brown; distal segments of antennae sometimes brownish; vertex often with a larger shining central area; antennae rather long but thick, segments with dense pubescence about as long as their diameter, segment 1 very thick, a little curved, three times as long as broad, shorter than 2 + 3, but longer than 3, 2 strongly pyriform, twice as long as broad, a little shorter than 3, 3 clearly shorter than 4, two and a half times longer than broad, 4–9 gradually decreasing in length and thickness, both 4 and 9 about three times as long as broad, 10 longer than 1, four and a half times as long as broad. Fore legs simple. Ninth sternite (fig. 56) with a proximal stalk as long as the distal part, which has two short lateral arms and a truncate distal lobe bearing about 14 bristles. Genitalia (fig. 37) with parameres considerably longer than gonoforceps; gonoforceps with a small, ill-defined distal inner process, without a membranous dorsal lobe.

Specimens examined :—76 ♂♂ and 112 ♀♀ including the following types: ♀ type *Dryinus brachycerus* Dalman (also ♂ coll. Dalman) (kindly sent from Stockholm by Dr. A. Roman); Britain ♀ (Walker coll.) (B.M.) (type of *Dryinus lyde* Walk.); Sutherland South, Bonar Bridge, 2 ♀♀ (*P. Cameron*) (B.M.) (types of *Anteon brevicollis* Kieff. and *A. triareolatus* Kieff.); Stirling, Clober ♀ (*P. Cameron*) (B.M.) (type of *A. flavitarsis* Kieff.), ♂ Kilsyth (*P. Cameron*) (B.M.) (type of *A. nigroclavatus* Kieff.); Renfrew, ♂ Bishopton (*P. Cameron*) (B.M.) (type of *A. indivisus* Kieff.); Dumfries, Eccles ♀ (*P. Cameron*) (B.M.) (type of *A. nigricornis* Kieff. = *A. obscuricornis* Kieff.); Sutherland, ♀ (*P. Cameron*) (B.M.) (type of *A. curvatus* Kieff. = *A. curvus* Kieff.); Herts, ♂ Felden (*A. Piffard*) (M.) (type of *Antaeon suffolciensis* Chitty).

I have seen British specimens from the following vice-counties: Staffs, Suffolk East and West, Hunts, Bucks, Herts, Kent West, London, Surrey, Berks, Hants South, Dorset, Somerset South, Devon South; Scotland, Sutherland South, Inverness East, Moray, Perth North, Argyll, Stirling, Lanark, Renfrew, Dumfries; Ireland, West Meath, Wicklow, Dublin.

I have also examined 3 ♀♀ France, no data (*de Gaulle*) (P.). *A. brachycerum* (Dalm.) is always easily recognised by the sculpture of the head; even if the

disc of the vertex is not clearly more shining than the sides, the alutaceous sculpture combined with very fine punctures is characteristic. The species seems to be locally abundant, in May and early June, especially on birch. It is difficult to imagine what host it can find there other than species of *Oncopsis*

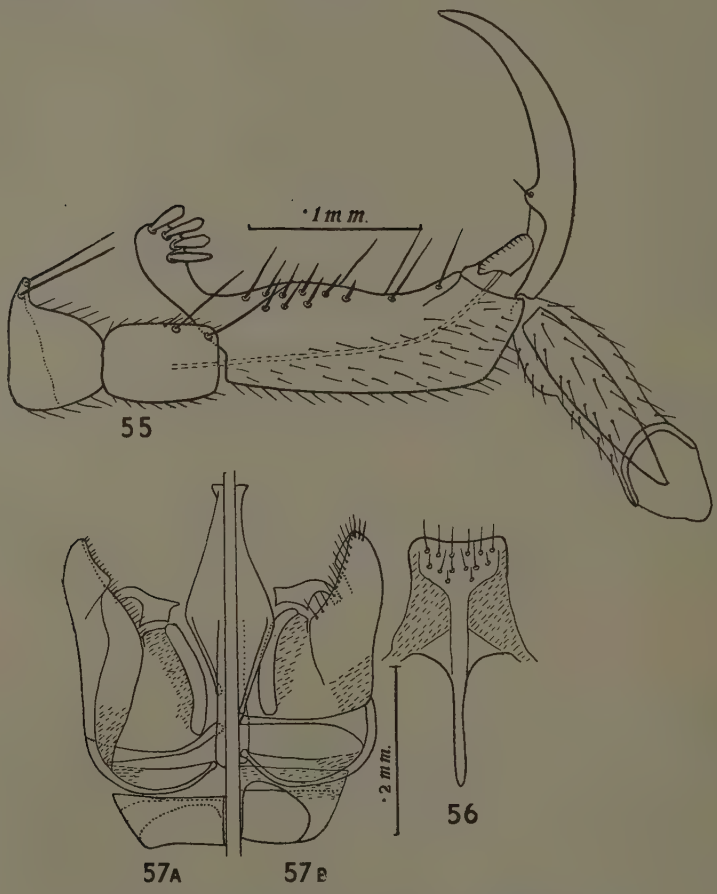


Fig. 55.—Chela and tarsal segments 3–4 of *A.* (*A.*) *brachycerum* (Dalm.) ♀.
Fig. 56.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 57.—Same species, genitalia, (a) dorsal, (b) ventral view ♂.

(Bythoscopidae); I once found a Dryinised nymph of an *Oncopsis* at Loch Maree, W. Ross, but it died before the parasite emerged. At Slough, Bucks, where *A. brachycerum* (Dalm.) is known to occur, I have examined a good many nymphs of *Oncopsis* without finding any parasitised ones, but Mr. P. Freeman found a number of parasitised nymphs with empty sacs in vi.1937.

A ♀ from Monks Wood, Hants (M.) is labelled "bred from *Leptothorax* nest." The dates of capture of the specimens I have examined are as follows :—

Month:	April	May			June				
Date:	22–28	29–5	6–12	13–19	20–26	27–2	3–10	11–17	18–24
No. of ♂♂	0	3	5	7	2	10	18	0	0
No. of ♀♀.	1	2	3	1	7	17	28	2	7

Anteon flavicorne (Dalman).

Gonatopus flavicornis Dalman, 1818.
Dryinus flavicornis Haliday and Walker (in part).
? *Anteon unicarinatus* Kieffer, 1906.

♀. Black; palpi, mandibles, antennae and legs (except usually dorsal streak on hind femora and more or less extensive proximal part of hind coxae), and tegulae bright yellow; distal part of fore and mid femora whitish. Wings hyaline, venation yellow, margins of pterostigma sometimes a little darker. Surface of body (except abdomen) with moderately numerous, outstanding, silvery hairs which become dense on anterior part of head. Length 2·5–4·0 mm.

Eyes bare; head, in dorsal view (including eyes), not quite twice as broad as long, vertex between eyes half as long again as broad, sides parallel in front, posteriorly with a rather weakly curved raised margin the anterior side of which is hardly crenate; antennae rather long, distinctly thickened distally, segment 1 with distal half a little thicker, hardly curved, scarcely longer than 2 + 3, four times as long as broad, 2 nearly cylindrical, two and a half times as long as broad, about as long as 5, 3–9 gradually decreasing in length and increasing in thickness, 3 three and a half times, 9 one and a half times as long as broad, 10 as long as 4, nearly three times as long as broad; vertex moderately to considerably shining, weakly alutaceous (either entirely or except for a variable area in front of ocelli), above antennae rugosely and confluently punctured, part between this rugose area and ocelli sometimes also with a number of shallow punctures, sometimes nearly smooth; lateral keels very distinct, central keel also usually quite distinct; curved impressions at sides of posterior ocelli obsolete; ocellar triangle equilateral, POL : OOL as 4 : 3, lateral margins of head behind the eyes as long as OOL, posterior ocelli removed from occiput by two-thirds to three-quarters the POL. Pronotum very short, more than twice as broad as long, moderately shining, rugose, with a narrow, posterior, smooth strip; mesonotum smooth, shining, sometimes sparsely punctured on anterior half, notaulices shallow, usually extending half-way across; scutellum nearly flat, smooth, shining, sometimes with a few punctures, posterior crenate furrow weak; metanotum ("postscutellum") with large shining central area; mesopleuron anteriorly closely and rather rugosely punctured, rather dull, postero-dorsally dull, rugose, postero-ventrally smooth, shining; metapleuron shining, finely rugose; propodeum with dorsal and posterior surface distinctly separated, former between one-half and two-thirds as long as latter, surface dull, finely clathrately rugose, posterior surface defined above by a more or less distinct, bisinuate transverse keel, centrally with an area twice as long as broad whose surface is more finely sculptured than surrounding parts, sometimes nearly smooth. Abdomen smooth and shining. Fore legs with segment 1 as long or a little longer than 2–4 together, 2 quadrate, 3 laterally produced, 4 half as long again as broad, articulating part of 5 (fig. 58) nearly as long as 1, free part a little longer than 4, segment 5 with 19 bristles and a distal group of 26 small lamellae; enlarged claw thick and curved. Radial vein in fore-wings with distal section about one-third as long as proximal.

♂. Black; palpi, mandibles, antennae (except usually more or less darkened dorsal surface of segments 1–5), legs except greater part of hind coxae and a more or less distinct dark streak on distal part of hind femora, tegulae, yellow. Wings hyaline, venation pale brown, pterostigma brown with a pale proximal spot. Surface of body (except abdomen) with rather numerous, outstanding, white hairs, which become dense on anterior part of head. Length 2·0–3·0 mm.

Eyes bare, or nearly so; head in dorsal view (including eyes), twice as broad as long, vertex between eyes one-third as broad again as long, posteriorly with a moderately curved

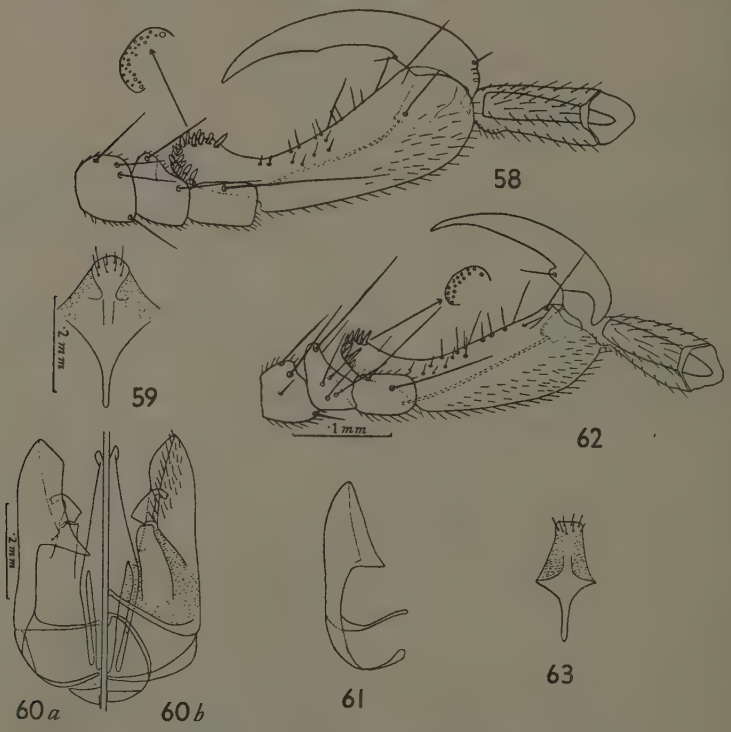


Fig. 58.—Chela and tarsal segments 2–4 of *Anteon* (*A.*) *flavicorne* (Dalm.) ♀.
Fig. 59.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 60.—Same species, genitalia, (a) dorsal, (b) ventral view ♂ (proximal lobes of gonoforcipes omitted).
Fig. 61.—Same species, right gonoforceps of another specimen ♂.
Fig. 62.—Chela and tarsal segments 2–4 of *Anteon* (*A.*) *jurineanum* Latr. ♀.
Fig. 63.—Same species, ventral view of ninth abdominal segment ♂.

raised margin the anterior side of which is crenate; antennae long and thin, with dense pubescence about half as long as diameter of segments, segment 1 cylindrical, nearly straight, not quite as long as 2 + 3, three and a half times as long as broad, 2 pyriform, twice as long as broad, 3 as long as 5, a little shorter than 4, three times as long as broad, 4–9 gradually decreasing in length, 4 three and a half times, 9 not quite three times as long as broad, 10 longer than 4, four times as long as broad; vertex rather dull, shallowly but

closely and rather rugosely punctured; lateral and central keels very weak; curved impressions at sides of posterior ocelli obsolete; ocellar triangle not quite equilateral (posterior side the longest), POL : OOL between 1 : 1 and 5 : 4, lateral margins of head behind eyes two-thirds as long as OOL, posterior ocelli removed from occiput by half the POL. Pronotum very short, more than twice as broad as long, weakly rugose; mesonotum smooth and shining, anterior half more or less closely and finely punctured, posterior half not or very sparsely punctured, notaulices weak, extending nearly half-way across; scutellum flat, punctured, posterior furrow rugose; metanotum (" postscutellum ") with a large central smooth area; mesopleuron anteriorly finely rugose, dull, postero-dorsally shining, finely rugose, postero-ventrally smooth and shining; metapleuron mostly dull and rugose; propodeum as in the female, but area of posterior face smoother, more shining, and more strongly defined. Abdomen smooth and shining, ninth sternite (fig. 59) with a long proximal stalk and a nearly circular distal lobe bearing eight bristles, laterally these sclerotised parts merge into membrane; genitalia (figs. 60–6) with gonoforceps bearing distally a large inner process (exact shape of the process varies), process fully twice as long as broad, inner anterior angle acute, and proximally a membranous lobe. Fore-wings with distal section of radial vein one-third proximal.

Specimens examined : Lincs North, Market Rasen, ♂, vi.1912 (M.); Norfolk East, Catfield, ♂, 8.vii.1920 (*J. J. F. X. King*) (G.); Suffolk East, Barham Wood, ♂, 13.v.1913 (M.); Gloster West, Staunton, High Meadow Woods, ♂, 5.vi.1936 (*E. B. Britton* and *J. F. Perkins*) (B.M.); Herts, Brickett Wood, ♀, 20.v., ♀, 26.v., ♀, 19.vi.1936, ♂, 20.v.1937 (*R. B. Benson*) (B.M.); Bucks, Brickhill, ♂, 21.vi.1937 (*R. B. Benson*) (B.M.); Middx, Northwood, ♂, v.1834 (H.W.); Surrey, Farnham, ♀ on poplar, 24.vii.1899 (*A. J. Chitty*) (M.); Hants South, New Forest, ♀, 1911 (*R. C. L. Perkins*) (B.M.); Ireland, Wicklow, ♂, 13.v.1934 (*A.W.S.*) (D.); no data, ♀ (M.), ♀ (H.W.), 3 ♂♂, 5 ♀♀ (H.D.), ♀ (Desvignes coll.) (B.M.), ♀ (Haliday coll.) (D.).

I have also examined the ♂ type of *Gonatopus flavicornis* Dalman, 1818, kindly sent from Stockholm by Dr. A. Roman; also the following continental specimens : Austria, Graz ♂, (*Giraud*), Vözlau, ♀ (*Giraud*), 2 ♀♀ (*Giraud*) (P.); France, La Ferté-Milon, ♂ (*de Gaulle*) (P.), Lille, ♂ (*de Gaulle*) (P.), Maisons-Lafitte, ♂, 7.v. (*de Gaulle*) (P.), no data, ♂ (*Fairmaire*) (P.).

Anteon unicarinatus Kieffer, 1906, was founded on a specimen in the Marshall collection. The type is probably lost, but owing to the variability in the sculpture of the present species, there is little reason to think that it was really distinct.

Anteon flavicorne var. **bensoni** var. n.

Structurally resembles *A. flavicorne* (Dalm.) but differs in colour as follows :—

♀. Mandibles with proximal half or more black; antennae black, segments 1 and 6–10 more or less pale beneath; legs with most of mid and hind coxae, a large ventral area on fore and mid femora, hind femora almost entirely, hind tibiae distally, black.

♂. Antennae brownish-yellow, first four segments more or less infuscate dorsally; most of all coxae, fore and mid femora considerably beneath, hind femora almost entirely, and hind tibiae distally, black.

Type ♀ Herts, Brickett Wood, 17.vi.1936 (*R. B. Benson*) (B.M.). Allotype ♂ Bucks, Halton, 14.vi.1936 (*R. B. Benson*) (B.M.). Paratypes, Herts, Boxmoor, 2 ♀♀, 23.v.1937, 2 ♀♀, 24.v.1937, 3 ♂♂, 17.v.1936 (*R. B. Benson*) (B.M.), Aldbury, 2 ♂♂, 1 ♀, 15.v.1936 (*R. B. Benson*) (B.M.), Brickett Wood, 5 ♀♀, 20.v., 3 ♀♀, 26.v., ♀, 9.vi.1936, ♀, 26.v.1937 (*R. B. Benson*) (B.M.); Bucks,

Ivinghoe, ♂, 26.v.1936 (*R. B. Benson*) (B.M.); Scotland, Dumfries, Gretna, ♂, 8.vi.1938 (*J. Murray*).

This variety agrees with *A. flavicorne* (Dalm.) in its sculpture and in the structure of the male genitalia, though at first sight it looks very distinct owing to its much darker colour. The typical form occurred with it.

Anteon reticulatum Kieffer, 1905 : 140.

Xenanteon reticulatus Kieffer, 1913.

The type of this species, France, Maisons-Lafitte, ♀, 22.viii. (*de Gaulle*) (P.), lacks both front legs, but from Kieffer's information is clearly an *Anteon* Jur. *s.s.* His figure of the front tarsus seems to place it near *A. flavicorne* (Dalm.) to which species it runs in my key. It differs from it in having the well-defined central area of the propodeum rather more transversely striate; in having the head shining with strong, raised reticulations; the mesopleuron with strong, mainly reticulate sculpture; the metapleuron with beautiful, regular, transverse striae; mesonotum shining, with rather numerous shallow punctures.

It is evidently a distinct species, allied to *A. flavicorne* (Dalm.) and it may well occur in this country.

Anteon jurineanum Latreille, 1809.

♀ *A. arcuatus* Kieffer, 1905 : 144. **syn. n.**
♀ *A. imberbis* Kieffer, 1905 : 149. **syn. n.**
♂ *A. flavinervis* Kieffer, 1905 : 192. **syn. n.**
♂ *A. parvulus* Kieffer, 1905 : 193. **syn. n.**
♂ *A. xanthostigma* Kieffer, 1905 : 190. **syn. n.**
? ♂ *A. succineipes* Kieffer, 1905 : 203.

♀. Black; palpi, mandibles, nearly always ventral side of antennal segment 1, legs and tegulae, yellow; greater or larger proximal part of all coxae and of fore femora, streak beneath mid femora, greater part of hind femora, and often distal part of hind tibiae, more or less dark brown; antennal segments often partly yellow-tinged beneath. Wings hyaline, venation very pale brown, pterostigma and radial vein brown, the former with a pale proximal spot. Surface of body (except abdomen) with moderately numerous, outstanding, pale hairs. Length 2·3–2·8 mm.

Eyes bare; head, in dorsal view (including eyes), twice as broad as long, vertex between eyes a little broader than long, sides parallel in front, posteriorly with a moderately curved feeble raised margin the anterior side of which is hardly crenate; antennae rather short, a little thickened, segment 1 distally a little thickened, a little curved, as long as 2 + 3, four times as long as broad, segment 2 weakly pyriform hardly shorter than 3, two and a half times as long as broad, 3–9 gradually decreasing in length and increasing in thickness, 3 nearly three times, 9 one and a third times as long as broad, 10 longer than 3, three times as long as broad; vertex rather dull, alutaceous grading into finely rugose (especially behind ocelli); central and lateral keels of vertex more or less distinct; curved impressions at sides of posterior ocelli obsolete; ocellar triangle about equilateral or with posterior side a little the longest, POL : OOL as 1 : 1, lateral margins of head behind eyes a little shorter than OOL, posterior ocelli removed from occiput by about two-thirds the POL. Pronotum very short, more than twice as broad as long, moderately rugose; mesonotum shining with rather numerous punctures which become closer in front where surface may be somewhat rugose, notaulices distinct but only extending about half-way across; scutellum a little convex, shining, sparsely punctured, posterior crenate furrow distinct; metanotum ("post-scutellum" with a large smooth central area; mesopleuron anteriorly closely but finely

rugose, dull, postero-dorsally similar, but rather less dull, postero-ventrally shining, with a few weak rugosities; metapleuron moderately shining, weakly rugose; propodeum with dorsal and posterior surfaces rather well separated, former more than half as long as latter, surface rather finely clathrately rugose, rather dull, posterior surface with a well-defined area about twice as long as broad, surface of area not more shining and only a little more finely sculptured than surrounding parts. Abdomen smooth and shining. Fore legs with segment 1 a little longer than 2–4 together, 2 quadrate, 3 laterally produced, 4 half as long again as broad, articulating part of segment 5 (fig. 62) a little shorter than the basitarsus, free part as long as 4, segment 5 with 18 bristles and a distal group of 16 small lamellae. Fore-wings with distal section of radial vein one-third as long as proximal.

♂. Resembles the female except in the following particulars: antennal segment 1 entirely yellow, other segments brown, yellow beneath; legs yellow, hind femora narrowly brown distally; pterostigma often paler; length 1·7–2·5 mm.; eyes more hairy; antennae much longer, filiform, segments with moderately dense, long pubescence, as long as diameter of segments, segment 1 cylindrical, much shorter than 2 + 3, longer than 3, three and a half times as long as broad, 2 about two-thirds as long as 3, two and a half times as long as broad, 3–9 decreasing very little in either length or thickness, all about three times as long as broad, 10 as long as 1, four times as long as broad; vertex rather dull, closely alutaceous, otherwise smooth, keels obsolete; ocelli a little closer to occiput. Propodeum more coarsely clathrate, posterior area less defined, its surface more rugose. Abdomen with ninth sternite (fig. 63) and genitalia as in *A.* (*C.*) *fulviventre* (Hal. *in* Curt.).

Specimens examined: Scotland, Dumfries, Eccles, ♀ (*P. Cameron*) (B.M.) (type of *Anteon arcuatus* Kieff.); Perth North, Rannoch, ♀ (*P. Cameron*) (B.M.) (type of *A. imberbis* Kieff.); Dumfries, 3 ♂♂ (*P. Cameron*) (B.M.) (types of *A. flavinervis* Kieff., *A. parvulus* Kieff., and *A. xanthostigma* Kieff.); Suffolk East, Barham Wood, ♀, 13.v.1933 (M.); ♂ "Gloster" (*P. Cameron*) (B.M.) (head more shining, with traces of punctures, but notaulices shorter than in *A.* (*C.*) *fulviventre* (Hal. *in* Curt.)); Herts, Boxmoor, ♀, 20.iv.1933 (*R. B. Benson*, Nixon leg.); Middx, Northwood, ♀, v.1824 (H.W.); Surrey, Coombe Wood, ♀, v.1831, ♀, 15.vi. (H.W.); Kent West, Eynsford, ♂, 18.vi.1932 (*G. E. J. Nixon*); Hants South, Brockenhurst, 3 ♂♂, 25–30.vi.1933 (*G. E. J. Nixon*); Devon South, Newton Abbot, ♀, 8.v.1923 (*R. C. L. Perkins*) (B.M.); Devon North, ♂, Barnstaple (F.); Scotland, Argyll, Kilmun, ♂, 19.vi.1925 (*J. J. F. X. King*) (G.); Dumfries, Newton Moss, ♀, 11.vi.1936 (*J. Murray*); Ireland, Leitrim, Tullaghan, ♂, 12.vii.1936 (A.W.S.); "Ireland," ♂ (*A. H. Haliday*) (D.); "British," 10 ♂♂ (*Haliday*) (D.), 4 ♂♂ (Walker coll.) (B.M.) (labelled *A. jurineanus*); ? locality, ♂ (*P. Cameron*) (B.M.), ♀, 21.v.1899 (*A. J. Chitty*) (M.); France, Maisons-Lafitte, ♂, vi. (*de Gaulle*) (P.).

The female of this species is close to *A. flavicorne* (Dalm.) but is smaller and darker, with a different chela. The male is less like *A. flavicorne* (the genitalia in any case being clearly different from that species) but is close to *A.* (*C.*) *fulviventre* (Hal. *in* Curt.). The sculpture of the head usually clearly differentiates them, but a few extreme varieties are less distinct.

A male (Kilkenny, 1.v.1936 (*A.W.S.*)) captured by Mr. A. W. Stelfox may perhaps belong here, but if so it is very aberrant. The legs, except the tibiae and first two tarsal segments of the fore legs, are dark; the antennae are black; with the segments rather shorter and thicker; the head is dull and alutaceous but also has dense though very shallow punctures; the genitalia are of the usual type. If this specimen is not an aberrant *A. jurineanum*, I cannot associate it with any female.

Latreille's original description (1809) of *A. jurineanum* ran as follows,

"nigrum, nitidum, pedibus flavescentibus. Habitat in Gallia." This description would apply to a number of species, but there was a tradition, at least amongst the early British Entomologists, that the present species was the one that Latreille described. Nearly all the specimens of this species in Stephens' and Walker's collections were identified as *A. jurineanum*. Latreille's type-specimen is lost and the species can probably never be certainly identified. As it is inconvenient not to know the characters of the genotype of an important genus, I propose to treat *A. arcuatus* Kieffer (of which the type is in the British Museum) as synonymous with *A. jurineanum*.

Subgenus *Chelogynus* Haliday.

Anteon (*Chelogynus*) *infectum* (Haliday *in* Walker).

♀ *Dryinus infectus* Haliday *in* Walker, 1837 : 419.
♂ *D. inclytus* Haliday *in* Walker, 1837 : 421.
♀ *D. lateralis* Thomson, 1860. **syn. n.**
♀ *Anteon fusiformis* Kieffer, 1905.
♂ *Anteon ellimani* Chitty, 1908.

♀. Black; palps, mandibles and antennae reddish-yellow, antennal segments 6–10 (rarely all segments) dark brown above; legs reddish-yellow, mid and hind coxae and narrow strip on fore coxae, usually postero-ventral streak on mid femora and usually almost whole of hind femur black; junctions of all femora and tibiae and indications of a dorsal stripe on fore tibiae, whitish; tegulae testaceous. Wings hyaline, distinctly clouded distally to pterostigma, rarely uniformly hyaline or almost so; the pterostigma (except very small proximal patch) and radial vein brown, other veins yellowish. Body covered throughout with numerous (except abdomen where they are sparse) outstanding white hairs. Length 3·0–4·5 mm., usually about 4·0 mm.

Eyes with a few hardly perceptible microscopic hairs; head, in dorsal view (including eyes), nearly twice as broad as long; vertex between eyes half as long again as broad, sides parallel in front; posteriorly with a raised margin which is straight over ventral half but curves backwards laterally, anterior side of margin crenate especially laterally; antennae thick, considerably thickened distally, with segment 1 somewhat curved and clavate, about three times as long as broad, considerably longer than 3, nearly as long as 2 + 3, 2 a little clavate, twice as long as broad, 3 and 4 of about same length, about three times as long as broad, as thick as 2, 5–9 considerably thickened, 9 only a little shorter than 5, 5 two and a half, 9 nearly twice as long as broad and about as long as 2, 10 as long as 3; vertex shining, closely, rather coarsely but shallowly punctured, much more closely in front and quite sparsely behind ocelli (degree of closeness varies considerably), lateral keels running from antennal sockets towards eyes, weak central keel from mid ocellus weak and short (sometimes almost absent); very small curved impression on outer side of posterior ocelli; ocellar triangle isosceles with sides to posterior base as 2 : 3, POL : OOL as 4 : 5; lateral margins of head behind eyes three-quarters as long as OOL; posterior ocelli removed from occiput by a distance hardly more than half POL. Pronotum about twice as broad as long, two-thirds as long as mesonotum, centre of anterior margin with a deep circular pit, disc transversely raised in profile considerably higher than a strip along both posterior and anterior margins, anterior part rugose tending to be transversely striate, disc shining, closely punctured, posterior part smooth, unpunctured; in lateral view deeply impressed, bottom of impression with transverse striae; mesonotum clearly longer than pronotum, shining, moderately strongly but sparsely (especially posteriorly) punctured; notaulices strong, extending across half its length; scutellum shining, sparsely punctured, posterior margin crenate; metanotum ("postscutellum") with a large central area smooth and shining; mesopleuron with anterior part dull, subrugosely punctured, postero-dorsal part

closely punctured, becoming rugose below, postero-ventral part shining, sparsely punctured, meso-metapleural suture crenate; metapleuron very weakly sculptured; propodeum with dorsal face about one-third as long as posterior, anteriorly with a crenate transverse furrow, surface dull, rugose, more coarsely so anteriorly, posterior face with central area well defined by keels, area about twice as long as broad but sides diverging upwards and then bending round to meet, surface shining, unsculptured or with sculpture very much finer than on parts outside area. Abdomen shining, almost bare. Fore legs with segment 1 not quite as long as 4, 2 produced proximally, articulating part of 5 (fig. 64), nearly as long as 4, a little longer than 1, free part rather more than one and a half times as long as segment 4, 5 with two rows of long lamellae with expanded tips, about 36 in all, no discontinuous distal group. Fore-wings with distal section of radial vein one-third length of proximal.

♂. Black; palps, mandibles (except teeth), ventral side of antennae (sometimes whole of last three or four segments), yellow-brown; legs yellow-brown, coxae, more or less large postero-ventral streak on mid and fore femora, nearly all hind femora (except sometimes small basal area; more rarely greater part or even all yellow), hind tibiae usually (except narrow base), dark brown to black; tegulae testaceous; wings hyaline, pterostigma with only very small pale proximal patch. Body covered throughout with numerous (except on abdomen), outstanding, white hairs. Length 2·3–3·3 mm.

Resembles female, but head broader, antennae with much longer dense pubescence on segments, about as long as half breadth of segments; vertex shallowly punctured but much more closely than in female, moderately shining; lateral keels of vertex almost undeveloped; lateral margins of head behind eyes not much more than half as long as OOL, posterior ocelli removed from occiput by less than half POL. Pronotum hardly visible dorsally, more than twice as broad as long; mesonotum more closely punctured, notaulices weaker. Ninth sternite (fig. 65) with a proximal and a distal stalk emitting curved lateral processes where they join; the distal stalk is expanded over its distal third, where it bears 10–12 bristles; distal expansion joined to lateral arms by broad membrane. Genitalia (fig. 66) with parameres expanded distally; gonoforceps approximately parallel-sided distally, not emitting a large inner process, proximally bearing large membranous lobes which are not "frayed out" distally; distivolsella tridentate at apex; basivolsella broad, meeting its fellow from other side, without bristles.

Specimens examined: Staffs, Madeley, ♀, 12.vi.1938 (*H.B.*); Northants, Helpston Heath, ♂, 13.vi.1908 (M.); Suffolk West, Brandon, ♂, 22.vi.1914 (legs, except mid coxae, yellow), ♂, 27.v.1924 (M.), Barton Mills, ♂♀, 4.vi.1916 (M.); Hereford, Fownhope, ♀, 2.vi.1936, 3 ♂♂, 31.v.1936 (*J. F. Perkins*) (B.M.), Woolhope, ♂, 30.v.1936 (*J. F. Perkins*) (B.M.); Monmouth, Trelleck Beacons, 2 ♀♀, 10.vi.1936 (*J. F. Perkins*) (B.M.); Gloster West, Staunton, ♀, 4.vi., ♂, 5.vi., ♀, 9.vi., ♀, 2 ♂♂, 11.vi.1936 (*J. F. Perkins*) (B.M.), Colesborne, ♀, 1900 (*J. Edwards*) (M.) (antennae almost entirely yellow, wings hyaline); Bucks, Marlow, ♀, 3.vi.1934 (*J. F. Perkins*) (B.M.), Brickhill, ♀, 21.vi.1937 (*R. B. Benson*) (B.M.), Chesham, ♂♀, 17.vi.1906 (*A. J. Chitty*) (M.) (the male is the type of *Antaeon ellimani* Chitty); Herts, St. Albans, ♀ (F.), Felden, ♀ (*A. Piffard*) (M.), Brickett Wood, ♂, 28.v.1937 (*R. B. Benson*) (B.M.); Surrey, Coombe Wood, ♀, 10.vi., ♀, 24.v.1829 (*J. O. Westwood*) (H.W.), Claygate, ♂, 11.vi.1932 (*G. E. J. Nixon*), Horsley, ♀, 2.vi.1828 on hazel (*J. O. Westwood*) (H.W.); Berks, Bagley Wood, ♀, 27.v.1916 (*A. H. Hamm*) (H.); Hants South, New Forest, Holiday Hill, ♀, 18.vi.1907 (M.); Isle of Wight, Marville Wood, ♂, 25.vi.1907 (M.) (paratype of *A. ellimani*); Wilts South, Salisbury, ♂, 24.vi.1911 (M.) (hind femora almost entirely yellow), Grovely, ♂, 27.vi.1911 (M.); Dorset, Glanvilles Wootton, ♀ (H.D.); Devon North, ♀, Barnstaple (F.); Ireland, Carlow, Bahanna Wood, ♂, 2 ♀♀, 9.vi.1935 (*A.W.S.*); Scotland,

Dumfries, ♀ (*P. Cameron*) (B.M.) (type of *Anteon fusiformis* Kieffer); British no data, ♀ labelled "*apicalis*" and ♂ (H.W.), 10 ♀♀, 10 ♂♂ (perhaps all from Glanvilles Wootton, two males with hind femora almost entirely yellow) (H.D.), ♂ (M.) (mesonotum hardly punctured on the posterior half), ♂, 4 ♀♀ (Stephens, Walker and Desvignes coll.) (B.M.), ♀ labelled "*Nomiopus apicalis*" (Stephens coll.) (B.M.), ♂ labelled "*inclytus*" (Walker coll.) (B.M.), ♀ (Cooke coll.) (B.M.), ♂ no data (Haliday coll.) (D.).

I have previously reported on the type ♀ of *Dryinus infectus* and the type ♂ of *Dryinus inclytus* (Haliday coll.) (D.) (Richards, 1935 : 152). Dr. A.

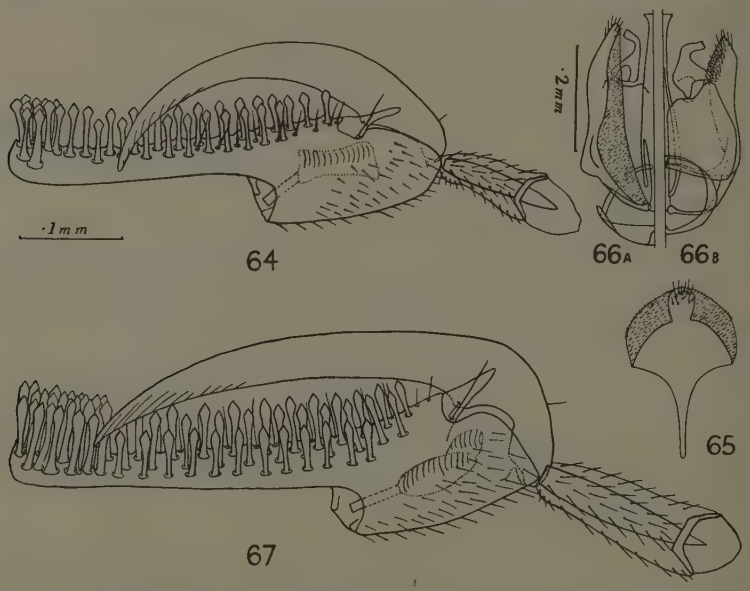


Fig. 64.—Chela of *A.* (*Chelogynus*) *infectum* (Hal. *in* Walk.) ♀.
Fig. 65.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 66.—Same species, genitalia, (a) dorsal, (b) ventral view ♂ (proximal lobes of gonoforcipes omitted).
Fig. 67.—Chela of *Anteon* (*Chelogynus*) *luteicorne* (Kieff.) ♀.

Roman kindly sent Thomson's type of *Dryinus lateralis* from Stockholm; further I have seen : France, Maisons-Lafitte, ♂, 2.v. and ♂, 2.vi. (*de Gaulle*) (P.), no locality, 3 ♂♂ (coll. Giraud) (P.); S. France, ♀ (Walker coll.) (B.M.).

It appears from the dates recorded that the species is found from the end of May to the end of June. It is widespread in the British Isles, though probably not very common.

Anteon (*Chelogynus*) *scapulare* (Haliday *in* Walker).

Dryinus scapularis Haliday *in* Walker, 1837.
Anteon longiforceps Kieffer, 1905: 151. **syn. n.**
A. carinatus Kieffer, 1905 : 152. **syn. n.**

♀. Black; palps, antennae beneath (except segment 10) and sometimes partly above, and legs reddish-yellow; coxae (except very narrowly distally) and major proximal part of

femora, black; tegulae testaceous. Wings hyaline, sometimes distally clouded; pterostigma and radial vein brown (former proximally narrowly pale), other veins yellow. Body covered throughout with numerous (except abdomen where they are sparse) outstanding white hairs. Length 4·0–5·0 mm. (according to Berland up to 5·5 mm.).

Eyes with a few, hardly perceptible, microscopic hairs; head, dorsal view (including eyes), nearly twice as broad as long, vertex between eyes nearly twice as long as broad, sides parallel in front; posteriorly with a raised margin which is feebly curved throughout, anterior side of margin crenate, especially laterally; antennae moderately thick, especially distally, with segment 1 somewhat curved and thickened, about three times as long as broad, hardly longer than 3, much shorter than 2 + 3, 2 hardly clavate, two and a half times as long as broad, 3 clearly longer than 4, four times as long as broad, as thick as 2, 4–9 gradually thickening and decreasing in length, 9 about two and one-third times as long as broad, clearly longer than 2, 10 as long as 5; vertex not very shining (more so discally and posteriorly), closely, shallowly, rugosely punctured (punctures becoming more distinct on disc), lateral keels running from antennal sockets towards eyes quite distinct, central keel from mid ocellus also strong, distinct curved impressions adjacent to posterior ocelli; ocellar triangle isosceles with sides to posterior base as 2 : 3, POL : OOL as 3 : 4, margins of head behind eyes three-quarters as long as OOL, posterior ocelli removed from occiput by a distance nearly equal to POL. Pronotum little broader than long, nearly as long as mesonotum, disc not or hardly raised, in profile almost regularly and only weakly curved from anterior to posterior margin, surface rugosely punctured tending to be transversely striate, with a narrow smooth strip along posterior margin, in lateral view deeply impressed, bottom of impression with some strong striae; mesonotum hardly longer than pronotum, shining, moderately strongly but sparsely (almost unpunctured posteriorly) punctured; notaulices rather strong, extending across half its length; scutellum shining, sparsely punctured, posterior margin crenate; metanotum ("postscutellum") with a rather large convex smooth central area; mesopleuron with anterior part shining, closely punctured, postero-dorsal part dull, rugose, postero-ventral part shining, sparsely punctured; meso-metapleural suture crenate; metapleuron punctured above, rugose below; propodeum with dorsal face about one-third as long as posterior, anteriorly with a strong crenate transverse furrow, dull rugose, more strongly so anteriorly, posterior face with central area well defined by keels and more than twice as long as broad, sides at first slightly diverging, then converging but not meeting above, surface moderately shining (sometimes a little alutaceous), at least large central part almost smooth, much more weakly sculptured than parts outside area. Abdomen smooth and shining. Fore legs with segment 1 only a little more than half as long as 4, 2 produced proximally into a strong hook, articulating part of segment 5 two-thirds as long as 4, a little longer than 1, free part as long as 3 + 4, 5 (cf. fig. 67) with approximately three rows of long lamellae with expanded tips, about 70 in all, no discontinuous distal group. Fore-wings with distal section of radial vein between one-third and one-half length of proximal.

♂. Resembles *A.* (*C.*) *infectum* (Hal. *in* Walk.) but larger; hind legs yellow; antennae with segment 4 distinctly longer than 1.

Specimens examined ♀♀: Sussex East, Hastings (*E. A. Butler*) (F.); Somerset North, Winscombe (*E. Saunders*) (M.); no data, type ♀ of *Dryinus scapularis* Haliday *in* Walker and one other ♀ (Haliday coll.) (D.). Walker (1837 : 419) recorded the species from Kent and from near London.

A male, France, Maisons-Lafitte, 13.vii. (*de Gaulle*) (C.P.) probably belongs to this species. The genitalia were not examined but the short notes made on the specimen are reproduced above. I have examined the type of *Anteon carinatus* Kieffer, 1905 : 152 (France, Maisons-Lafitte, ♀ (*de Gaulle*) (P.)) and the lectotype (fixed by Berland, 1928 : 164) of *A. longiforceps* Kieffer, 1905 : 151 (France, Clamart, ♀, 10.vi.1888 (*de Gaulle*) (P.)). The former is certainly a

synonym of *A. scapulare* (Hal. *in* Walk.) and the latter, though now nearly completely without a head, is almost certainly one.

Anteon (*Chelogynus*) *luteicorne* (Kieffer).

Anteon carinatus var. *luteicornis* Kieffer, 1905 : 152.
A. punctatus Kieffer, 1905 : 168. **syn. n.**

♀. Black; palps, mandibles except small proximal area, antennae except small dorsal area on last three segments, legs except small proximal part of first four coxae, proximal two-thirds of hind coxae, and small proximal brownish marks on all femora, yellow; tegulae yellow. Wings hyaline, very little darkened distally; pterostigma and radial vein brown, small proximal area on former whitish; other veins whitish. Length 3·0–3·5 mm.

Very close to *A.* (*C.*) *scapulare* (Hal. *in* Walk.) but differs as follows: vertex between the eyes half as long again as broad, considerably more shining, punctures sparser and more distinct, only confounded with rugosities at extreme sides, impressions at sides of ocelli weak; antennae with segment 1 nearly as long as 2 + 3. Pronotum a little more transverse. Mesopleuron with postero-dorsal part punctured rather than rugose. Propodeal area more as in *A.* (*C.*) *infectum* (Hal. *in* Walk.). Chela, fig. 67.

♂. Unknown.

Specimens examined ♀♀: Dorset, Glanvilles Wootton, 17.vi.1878 (H.D.); Austria, Graz (*Giraud*) (P.); France, Maisons-Lafitte, 1 ex., v., 2 ex., 13.vi., 1 ex., no date (*de Gaulle*) (P.) (one the type of *A. punctatus* Kieffer); no data, ♀ (*Sichel*) (P.).

The specimens agree closely with Kieffer's description (1905 : 152) of his *Anteon carinatus* var. *luteicornis* which was captured in Hungary. It is very closely allied to *A.* (*C.*) *scapulare* (Hal. *in* Walk.) but with the material at present available must be kept distinct.

Anteon (*Chelogynus*) *rufulocolle* Chitty.

Antaeon rufulocollis Chitty, 1908.

♀. Black; palps, mandibles, antennal segments 1–3, pronotum, legs except distal extremity of hind femora, and tegulae yellow. Base of abdomen testaceous-tinged. Wings hyaline, pterostigma and radial vein brown, veins pale yellow. Surface of body (except abdomen) with rather numerous outstanding pale hairs. Length 3·5 mm.

Eyes almost bare; head, in dorsal view (including eyes), less than twice as broad as long; vertex between eyes one and two-thirds times as long as broad, sides moderately convergent in front, posteriorly with a moderately curved, feebly raised margin, the anterior side of which is hardly crenate; antennae of moderate length, moderately thickened, segment 1 considerably thickened and curved, three times as long as broad, as long as 2 + 3, a little thickened distally, two and a half times as long as broad, as long as 4, 3 a little thinner than 2, distinctly longer than 4, three times as long as broad, 4–9 gradually increasing in thickness and decreasing in length, 4 a little more than two and a half times, 9 twice as long as broad, 10 nearly as long as 1; vertex shining, sparsely and not very coarsely punctured (more closely quite anteriorly), lateral keels running from antennal sockets very weak, central keel from mid ocellus obsolete, curved impressions at sides of posterior ocelli weak; ocellar triangle equilateral, POL : OOL as 1 : 1, lateral margins of head behind the eyes a little longer than OOL, posterior ocelli removed from occiput by the same distance as the POL. Pronotum about one-third broader than long, sides very little divergent behind, in profile flat and sloping down very little to anterior margin, surface shining, sparsely punctured, rather closely so on anterior quarter, posterior fifth smooth and hyaline, rather

clearly marked off; pronotum in lateral view moderately deeply impressed, impression shining, crossed by a few keels; mesonotum a little shorter than pronotum, shining, unpunctured, notaulices very short and weak; scutellum smooth and shining, crossed posteriorly by a row of rather small punctures; metanotum (" postscutellum ") with central area smooth and shining with a few punctures; mesopleuron anteriorly dull, finely rugosely punctate, postero-dorsally dull and rugose, postero-ventrally smooth and shining; mesometapleural suture strongly crenate; metapleuron shining, rugose; propodeum with dorsal surface not quite half as long as posterior, anterior transverse furrow rather weak, not crenate, surface moderately shining, rather coarsely rugose, posterior surface with well-defined area, less than twice as long as broad (sides diverging upwards), surface of area more finely rugose than parts outside it, dull. Abdomen smooth and shining. Fore legs (fig. 68) with segment 1 nearly one and a half times as long as 4, 2 obtusely produced proximally, articulating part of 5 about as long as 4, free part a little longer than 1, 5 with two rows of somewhat spatulate lamellae, about 18 in all, two rows of bristles, and a distal, scarcely

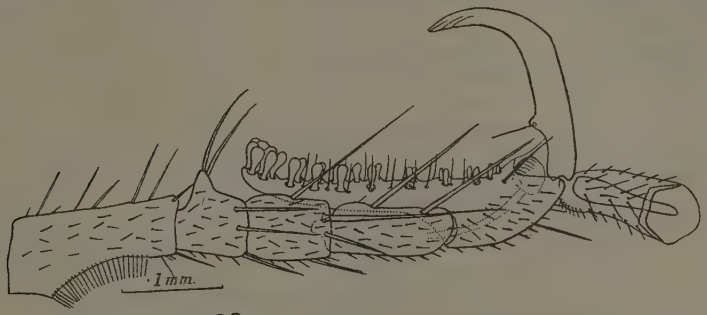


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Fig. 68.—Fore tarsus and chela of *A.* (*C.*) *rufulocolle* Chitty ♀.

discontinuous group of about 7 lamellae. Fore-wings with distal section of radial vein about one-third proximal.

♂. Unknown.

Specimens examined: Type ♀, Berks, Tubney, 1.vii.1906 (*A. J. Chitty*) (M.).

Various authors have described a species which they termed *Dryinus*, or *Anteon*, *dorsalis* (e.g., Nees, Thomson, Kieffer). Nees (1834 : 372) does not, strictly speaking, describe a *Dryinus dorsalis* so much as suggest that his species is the same as *Bethylus dorsalis* Fabricius, [1805] : 238.

Fabricius described *B. dorsalis* from a specimen captured at Kiel. A female specimen (now lacking the abdomen), still bearing Fabricius' label, was kindly sent to me by Herr Dr. O. Schröder of Kiel University. It is a *Meria* (*Myzine*), probably *M. tripunctata* (Rossi, 1790). If it is the genuine type and the locality given by Fabricius is correct, the species must have at one time occurred considerably further north than it is known at the present day (northern limit Wiesbaden and Posen, according to Schmiedeknecht).

The types of the Dryinids and Bethylids described by Nees are all lost, according to information kindly sent by Herr Prof. Dr. A. Reichensperger, Bonn. The real nature of *D. dorsalis* Nees can probably never be decided. *Dryinus dorsalis* Förster seems to be *A.* (*C.*) *ephippiger* var. *collare* (Dalm.) (see p. 268). The identity of *D. dorsalis* Thomson is discussed on p. 278. *Anteon dorsalis* Kieffer is probably the same as the present species, though I have not seen specimens identified by Kieffer.

Anteon (*Chelogynus*) *fulviventre* (Haliday *in* Curtis).

♀ *Dryinus fulviventris* Haliday *in* Curtis, 1828.
♀ *D. ephippiger* of Walker and Haliday, *nec* Dalman.
♀ *Anteon gracilicollis* Kieffer, 1905 : 165.
♂ *A. vulgaris* var. *trivialis* Kieffer, 1905 : 21. **syn. n.**
? ♀ *A. fuscicollis* Kieffer, 1906.
♀ *Chelogynus ephippiger* var. *similis* Kieffer, 1914.
♀ *C. alutaceus* Richards, 1935. **syn. n.**

♀. Black; palps and distal half of mandibles yellowish; antennae brown (sometimes pale yellow), segment 1 paler beneath, 6 or 7–10 reddish-yellow; often more or less distinct, dark reddish spots on head, pronotum, mesonotum and scutellum; legs pale brown, coxae proximally often almost black, thickened part of femora more or less darkened, fore femora distally whitish, hind femora usually distally darker; abdomen more or less red-brown, or with spots of this colour. Wings hyaline, venation and pterostigma pale yellow. Body covered (except on abdomen) with rather sparse, outstanding pale hairs. Length 2·0–3·0 mm.

Eyes with quite distinct but rather sparse pubescence; head, in dorsal view (including eyes), a fraction less than twice as broad as long; vertex between eyes about one and two-thirds times as long as broad, sides converging, posteriorly with a regularly but very slightly curved raised margin, the anterior side of which is scarcely crenate; antennae thin, moderately thickened distally, with segment 1 a little curved and clavate, almost four times as long as broad, as long as 2 + 3, 2 distinctly clavate, more than twice as long as broad, as long as segment 5, 3 markedly thinner than 2, distinctly longer than 4 (rarely of nearly same length), about three and a half times as long as broad, 4–9 gradually decreasing in length and increasing in thickness, 4 three times, 9 about one and a half times as long as broad, 10 as long as 4; vertex dull, finely and regularly shagreened, lateral keels running from antennal sockets weak, but traceable along inner orbits almost to level of ocelli, central keel from mid ocellus distinct but usually short, no curved impressions at sides of posterior ocelli; ocellar triangle equilateral (posterior side hardly perceptibly the longest), POL : OOL between 1 : 1 and 3 : 4, lateral margins of head behind eyes as long as OOL, posterior ocelli removed from occiput by a distance only a fraction less than POL. Pronotum about as long as broad, sides only a little divergent behind, in profile flat for posterior two-thirds and sinking gently to anterior margin, surface dull and alutaceous with a few very shallow punctures (sometimes anterior part is partly transversely striate, in a few specimens strongly so), a narrow posterior strip smooth and shining; in lateral view, rather deeply impressed, impression shining, hardly striate; mesonotum clearly shorter than pronotum, moderately shining, finely shagreened, notaulices rather strong, extending across more than half its length; scutellum shining, weakly shagreened, with a strong transverse crenate line a little before posterior margin; metanotum (" postscutellum ") with a large central shagreened area; mesopleuron with anterior part moderately shining, weakly subrugosely punctured, postero-dorsal part coarsely rugose, postero-ventral part with a smooth shining area; meso-metapleural suture weakly crenate; metapleuron shining, weakly rugose; propodeum with dorsal surface about half as long as posterior, anteriorly with a very indefinite crenate transverse furrow, surface moderately shining, finely and regularly, reticulately rugose, posterior surface with a feebly defined central area about twice as long as broad, area rugose like parts outside it. Abdomen bare and shining. Fore legs (fig. 69) with segment 1 two-thirds as long as 4, 2 weakly produced proximally, articulating part of 5 (fig. 70) not quite as long as 1, free part a little less than one and a half times as long as 4, 5 with one row of about 20 small lanceolate lamellae and one row of about 16 bristles, in addition with a distal discontinuous group of 5–6 lamellae (one or two of which are sometimes longer than the others). Fore-wings with distal section of radial vein hardly more than one-third the proximal.

♂. Black; palps, mandibles and legs yellow, thickened part of mid and hind femora sometimes a little darkened, mid and hind coxae narrowly dark at base; antennae light to dark brown, underside, especially of scape, paler, yellow to yellow-brown; tegulae testaceous. Pterostigma light brown, other veins pale. Surface of body (except abdomen) with rather numerous outstanding pale hairs. Length 1·3–1·75 mm.

Eye almost bare; head, in dorsal view (including eyes), more than twice as broad as

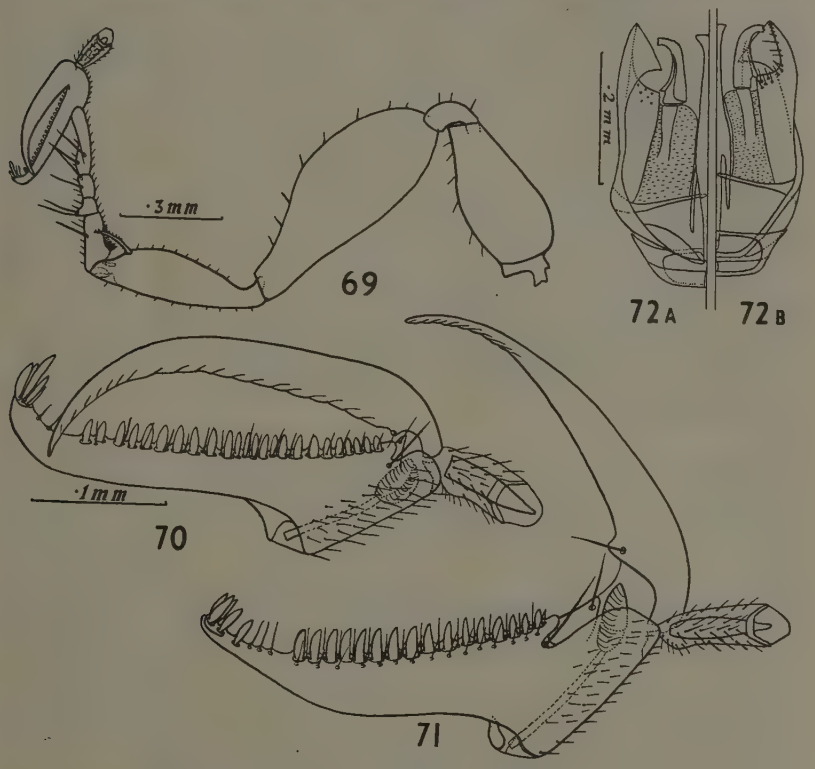


Fig. 69.—Fore leg of *A.* (*C.*) *fulviventre* (Hal. *in* Curt.) ♀.
Fig. 70.—Same species, chela ♀.
Fig. 71.—Chela of *Anteon* (*Chelogynus*) *ephippiger* (Dalm.) var. *collare* (Dalm.) ♀.
Fig. 72.—Same species, genitalia, (a) dorsal, (b) ventral view ♂ (proximal lobes of gonoforcipes omitted).

long; vertex between eyes one and two-thirds times as broad as long, sides parallel in front, posteriorly with a moderately curved, strongly raised margin, the anterior side of which is feebly crenate; antennae long and filiform, with long pubescence, segment 1 cylindrical, little curved, three times as long as broad, not quite as long as 2 + 3, 2 pyriform, one and a half times as long as broad, rather more than half as long as 3, 3–9 of approximately the same length but the distal segments a little longer and thinner, 3 three to three and a half times as long as broad, sometimes distinctly shorter than 4, 10 four times as long as broad, nearly as long as 2 + 3; vertex shining, hardly at all punctured between antennae and ocelli, traces of indefinite punctures only near eyes, behind ocelli with numerous feebly impressed

punctures, keels of vertex obsolete, but centre occupied by a weak longitudinal depression, no curved impressions at sides of posterior ocelli; ocellar triangle with posterior side a little longer than the lateral ones, POL : OOL as 1 : 1, lateral margins of head behind the eyes nearly as long as OOL, posterior ocelli removed from the occiput by from one-half to three-quarters the POL. Pronotum more than twice as broad as long, dull and rugose, posterior margin very narrowly shining; mesonotum shining, almost unpunctured, anterior quarter (especially on disc) weakly rugose, duller, notaulices distinct, weakly crenate, extending half-way across mesonotum, parapsidal furrows also developed as weak impressed lines between the notaulices and the lateral margin; scutellum smooth and shining with a strong crenate furrow at posterior margin; metanotum (" postscutellum ") with a large smooth central area; mesopleuron anteriorly and postero-dorsally dull and rugose, postero-ventrally shining, usually almost unsculptured, sometimes partly rugose; metapleuron shining, weakly rugose; propodeum with dorsal and posterior surfaces not clearly separated, former less than half as long as latter, anterior transverse furrow very feebly developed, surface dull and rather coarsely rugose, especially posterior part, posterior surface with an ill-defined central area, a little more than twice as long as broad, with its surface distinctly more finely sculptured but still dull. Abdomen bare and shining; ninth sternite (cf. fig. 63) with a very long proximal stalk (more than half length of sternite), two lateral arms beyond the middle, and a distal, approximately oval plate, bearing about ten long bristles; genitalia (cf. fig. 72) with gonoforceps distally turned inwards, forming a broad triangular process the inner angle of which is about 90°; distivolsella long, bent outwards, distal extremity weakly dentate; each gonoforceps anteriorly emitting a long membranous lobe which lies above the genitalia. Fore-wings with distal section of radial vein between one-third and one-half proximal.

Specimens examined ♀♀: Yorks North East, nr. Whitby, Mulgrave Wood, 4.v.1936 (*H. Britten*) (B.); Cheshire, Ashton-on-Mersey, sweeping ix.1931 (*W. H. Storey*) (B.); Staffs, Madeley, 25.vi.1935 on window (B.); Bucks, Burnham Beeches, 4.vii.1911 (*C. Waterhouse*) (B.M.) (very small specimen, length 2 mm., head more shining), Slough, on cabbage, 15.vi.1933 (*O.W.R.*); Surrey, Ashtead, 30.vii.1932 (*G. E. J. Nixon*); Dorset, Glanvilles Wootton (H.D.); no data, 3 ex. (Walker coll.) (B.M.), 2 ex. (Desvignes coll.) (B.M.) (one with antenna 3 nearly = 4), 2 ex. (B.M.), 3 ex. (H.D.) (? from Glanvilles Wootton); Scotland, Lanark, Possil Marsh (*P. Cameron*) (B.M.) (type of *Anteon gracilicollis* Kieff.); Dumfries, Gretna, 16.vii.1934 (*J. Murray*). I have further examined the type of *Dryinus fulviventris* from the Haliday collection (D.) (Richards, 1935 : 152), and a specimen from Curtis' collection (C.) which may be regarded, perhaps, as a paratype. Neither bears any locality data. For a discussion of *Anteon ephippiger* var. *similis* Kieffer, which is another synonym, see below.

One paratype of *Chelogynus rufovariegatus* Berland, 1928 (Landes, Préchacq, ♀, 24.vi. (*de Gaulle*) (P.)) is an aberrant specimen of this species. The head is not quite so dull as usual, though unpunctured. The antennae are entirely pale yellow, and a little longer and thinner than usual. The legs are entirely yellow, except the tip of the hind femora. The pronotum is mainly reddish, subrugosely punctured. The abdomen is black.

♂♂: Argyll, Claddich (*P. Cameron*) (B.M.) (type of *Anteon vulgaris* var. *trivialis* Kieff., *see* Richards, 1936a : 464); Yorks North West, Bainbridge, Roman Road, 1500–1800 ft., at grass-roots, 2.vii.1936 (*O.W.R.*); Suffolk East, Southwold, on reeds, 6.ix.1907 (M.); Suffolk West, Mildenhall, Judes Bridge, 20.vi.1915 (M.); London, Wandsworth Common, 1 ex. 2.viii.1835 and 1 ex. 1833 (*J. O. Westwood*) (H.W.); Surrey, Coombe Wood, 2.viii.1833 (*J. O.*

Westwood) (H.W.), Richmond Park, 1 ex. 4.vii.1835, 3 ex. vi., 2 ex. no date (one very small, length 1·3 mm., flagellar segments barely three times as long as broad, propodeum more finely sculptured) (*J. O. Westwood*) (H.W.); Hants South, New Forest, Fidley, 23.vi.1934 (M.); Devon South, Dartmoor, Lustleigh, vi.1934 (*J. F. Perkins*) (B.M.); Ireland, Cork West, Glengarriff Lodge, in ants' nest, 20.vii.1935 (*A.W.S.*); Sligo, Streedagh, 27.vii.1933 (*G. E. J. Nixon*) (vertex with more numerous punctures, hind femora and tibiae brown-tinged); Dublin, The Slade of Saggart, 22.vii.1936 (*A.W.S.*); no data, 2 ex. labelled "*Gonatopus scapularis*" (Stephens coll.) (B.M.), (one with vertex with quite numerous punctures), 1 ex. (with vertex with quite numerous punctures and mid and hind femora distinctly brown-tinged) (H.W.), 5 ex. (in one antennal segments are rather shorter and thicker and in others the hind legs are brown) (H.D.); "British," 2 ex. (*Haliday*) (D.).

The above males which correspond to *Anteon trivialis* Kieffer belong, I think, to the females of *A.* (*C.*) *fulviventre*. I have given some evidence for this view on p. 235. *Anteon fuscicollis* Kieffer, 1906, is probably a synonym of the present species, but the type, which was in T. A. Marshall's collection, is lost.

Anteon (*Chelogynus*) *fulviventre* var. *alutaceus* (Richards, 1935).

♀. Yellow; tips of mandibular teeth pitchy; a minute spot at articulation of fore-wings, a variable patch on disc of dorsal and posterior surfaces of propodeum, sometimes part or all of metanotum, a small anterior streak on first abdominal tergite, black.

Structurally identical with *A.* (*C.*) *fulviventre*, apart from small differences, which are variable.

♂. Unknown.

Specimens examined ♀♀: type of *C. alutaceus*, "British" (*Haliday*) (D.) (Richards, 1935 : 152); 1 ex. "British" (*Haliday*) (D.) (*Dryinus ephippiger* of Haliday); Dorset, 4 ex. Glanvilles Wootton (H.D.); Ireland, Sligo, Trewalua, 25.vi.1936 (*A.W.S.*).

I have seen no intermediate between this striking colour variety and the typical form. I have previously explained (1935 : 152) that *Dryinus ephippiger* var. *similis* was not described by Walker but must be ascribed to Kieffer (1914). As Kieffer defines his variety, it corresponds to the dark form of the species and it is therefore a complete synonym of *A.* (*C.*) *fulviventre* (Hal. *in* Curt.). The form which I described in 1935 as *C. alutaceus*, I believe now to be only a rather aberrant specimen of the yellow variety of *A.* (*C.*) *fulviventre*.

Anteon (*Chelogynus*) *ephippiger* (Dalman, 1818).

♀ *Gonatopus ephippiger* Dalman, 1818 : 81.
♀ *G. collaris* Dalman, 1818 : 82. **syn. n.**
♂ *Dryinus tenuicornis* Dalman, 1823. **syn. n.**
♀ *Gonatopus cephalotes* Ljungh, 1824. **syn. n.**
♂ *Dryinus alorus* Walker, 1837. **syn. n.**
♂ *D. fuscipes* Thomson, 1860. **syn. n.**
♂ *Anteon fuscoclavatus* Kieffer, 1905 : 196. **syn. n.**
♂ *A. triangularis* Kieffer, 1905 : 197. **syn. n.**
♂ *A. divisus* Kieffer, 1905 : 197. **syn. n.**
♀ *A. claricollis* Kieffer, 1906 : 514. **syn. n.**
♀ *A. brevifilis* Kieffer, 1906 : 514. **syn. n.**
♀ *Chelogynus rufovariegatus* Berland, 1928 (exclusive of Landes specimen). **syn. n.**

♀. Pale yellowish-red; eyes, metapleuron sometimes, propodeum and anterior spot on abdominal petiole, black; metanotum ("postscutellum") and minute spot at articulation of fore-wings brown. Tegulae and distal part of fore femora almost white. Length 2·0 mm.

Structurally only differs from *A.* (*C.*) *lucidum* (Hal. *in* Curt.) (p. 270) as follows: vertex strongly shining, dorsal part with a very few shallow, indefinite punctures, more anterior part (just above antennae) with numerous fine shallow punctures; pronotum almost unpunctured; mesonotum unpunctured, notaulices rather deeper and better defined; fore basitarsus apparently rather longer compared with segment 4.

Anteon (*Chelogynus*) *ephippiger* var. *collare* (Dalman).

♀. Black; palps, mandibles, legs (except narrow proximal part of hind coxa and narrow distal part of hind femora), and tegulae, yellow; antennae yellow-brown, segments 3–10 inclusive often rather darker, especially dorsally, 1–2 sometimes paler yellow. Pronotum nearly always more or less extensively red-tinged (sometimes yellowish-red, rarely yellow, usually pitchy red); mesonotum sometimes a little, head more rarely red-tinged. Wings hyaline, pterostigma and veins yellow. Body (except abdomen) covered with rather sparse, outstanding, pale hairs. Length 2·3–3·0 mm.

Vertex sometimes moderately shagreened, but always much less so than in *A.* (*C.*) *fulviventre* (Hal. *in* Curt.), pronotum often distinctly punctured though usually less so than in *A.* (*C.*) *lucidum* (Hal. *in* Curt.). Chela, fig. 71.

♂. Black; palps, mandibles, fore legs except coxae end, sometimes ventral side of femora, mid legs except coxae and greater part of femora (especially ventrally), yellow; hind tibiae light brown, hind femora more or less brown-tinged; tegulae testaceous; antennae with segment 1 sometimes brown-tinged. Wings hyaline, pterostigma brown, veins light brown. Surface of body (except abdomen) with numerous outstanding pale hairs. Length 2·0 mm.

Very close to *A.* (*C.*) *fulviventre* (Hal. *in* Curt.), differing as follows: head rather less broad, vertex between eyes hardly one and a half times as broad as long; antennae a little longer and thinner, 4 nearly four times as long as broad; vertex with numerous though shallow punctures; notaulices weaker; propodeum with central area of posterior surface hardly traceable; genitalia, fig. 72.

Specimens examined ♀♀: typical form, no data (probably Dorset, Glanvilles Wootton) (H.D.); Austria, Wien, Prater (*Giraud*) (P.) (metapleuron black).

Mr. J. F. Perkins kindly examined the type of *Gonatopus ephippiger* Dalman, 1818, at Stockholm and reports that it is the same as the species here described.

var. *collare* (Dalman).

(= *cephalotes* (Ljungh) = *claricollis* Kieff. = *brevifilis* Kieff.).

Specimens examined ♀♀: Yorks Mid-West, Ingleton, at roots of grass, 1.vii.1936 (*O.W.R.*); Suffolk West, Tuddenham, 21.vi.1909 (M.) (colour of antennae as in *A.* (*C.*) *lucidum* (Hal. *in* Curt.), posterior part of vertex also with rather more punctures, but pronotum yellow, unpunctured; pterostigma brown. Probably referable to present species); Cambs, Wicken Fen, 11.viii.1931 (*G. J. Kerrich*) (Ca.), Cambridge, 1917 (*G. T. Lyle*) (M.), Cambridge, Ent. Field Lab., 27.vi.1935 (*G. C. Varley*) (Ca.); Surrey, Coombe Wood, viii.1833 (*J. O. Westwood*) (H.W.), Combe Wood, " when caught it had hold of a small Homopterous insect with its mandibles " (*R. Lewis*) (H.W.), Richmond Park, viii.1833 (*J. O. Westwood*) (H.W.), New Malden, viii.1930 (*A. M. Low*), Oxshott, 9.viii.1930 (*G. E. J. Nixon*); London, Wandsworth Common, viii.1833 (*J. O. Westwood*) (H.W.), Norwood, vii.1929 (*G. E. J. Nixon*); Isle of Wight, Niton, with *Formica fusca* L. (*H. St. J. K. Donisthorpe*) (B.M.D.) (*see* Donisthorpe, 1927a : 107; specimen determined by Kieffer as *C. brevifilis*); Somerset South, Stoke St. Gregory, 8.viii.1934 (*H. Britten*) (B.); Ireland, Killarney, Ardagh,

8.viii.1929 (*E. F. Bullock*) (A.W.S.); Wicklow, Lug 2000 ft., 26.vi.1937 (*A.W.S.*); Dublin, The Slade of Saggart, 12.viii.1936 (*A.W.S.*); Kerry South, Dunkerron, 5.vii.1935 (*A.W.S.*) (antennae brown; pronotum black); "Britain," 2 ex. (Haliday coll.) (D.), 2 ex. (Walker coll.) (B.M.) (determined as *C. lucidus*), 1 ex. (Desvignes coll.) (B.M.) (determined as *C. lucidus*), 2 ex. (Westwood coll.) (H.W.) (one with pronotum almost yellow), 1 ex. (Dale coll.) (H.D.). Also Germany, Aachen 3 ex. (*A. Förster*) (B.M.) (det. as *Dryinus collaris*); no locality, 1 ex. (coll. Fairmaire) (P.); Austria, Wien, Prater, 1 ex. (*Giraud*) (P.) (last 2 ex. both with pronotum entirely yellow and head more punctured than usual; det. as *collaris* in coll. Paris); also the type of *Gonatopus cephalotes* Ljungh kindly sent from Lund by Dr. N. A. Kemner. Mr. J. F. Perkins reported on the type of *Gonatopus collaris* Dalman at Stockholm.

I have not seen the types of *Anteon brevifilis* Kieff., and *A. claricollis* Kieff., though I have seen a specimen of the former which had been identified by Kieffer. The types should be in the T. A. Marshall collection and are probably lost. From the descriptions, however, it appears that *A. claricollis* refers to the specimens with paler and *A. brevifilis* to the specimens with darker prothorax of the var. *collare* (Dalm.). These intergrade so completely that I have not separated them. The type of *Chelogynus rufovariegatus* Berland, 1928, was a female of which the locality label was stated to be illegible. Actually the label reads "Richmond Pk. June" in Westwood's handwriting. It is a specimen with a pale pronotum (*claricollis*). One paratype ♀ Austria (*Giraud*) is similar but with the pronotum dark. The second paratype is mentioned under *A.* (*C.*) *fulviventre* (Hal. *in* Curt.).

♂♂. (*tenuicornis* (Dalm.) = *alorus* (Walk.) = *fuscipes* (Thoms.) = *triangularis* Kieff., etc.): Type of *Dryinus alorus* Walk., "Britain" (Walker coll.) (B.M.) (*see* Richards, 1935 : 151); type of *A. fuscoclavatus* Kieff., Lanark, Cadder (*P. Cameron*) (B.M.) (*see* Richards, *loc. cit.*); type of *A. triangularis* Kieff., Sutherland, Bonar (*P. Cameron*) (B.M.) (*see* Richards, 1936a); type of *A. divisus* Kieff., Stirling, Mugdock (*P. Cameron*) (B.M.) (*see* Richards, 1936a); Westmorland, near Barras, over 1200 ft., 21 ex. at grass-roots, 5.vii.1936 (*O.W.R.*); Yorks North West, Bainbridge, Roman Road, 1500–1800 ft., 2 ex. at grass-roots, 2.vii.1936 (*O.W.R.*); Yorks Mid West, Ingleton, 3 ex. at grass-roots, 1.vii.1936 (*O.W.R.*); Cheshire, Dunham Pk. (*P. Cameron*) (B.M.) (det. as *A. nitidus* Kieff.); Suffolk West, Tuddenham, 12.vi.1908 (M.), Brandon, Palmers Heath, 22.vi.1914 (M.); Middlesex, Hillingdon, 2 ex., vi.1931 (*G. E. J. Nixon*); London, Dulwich, 20.vi. (H.W.); Kent West, Eynsford, 2 ex., 18.vi.1932 (*G. E. J. Nixon*); Surrey, Bookham, 26.vi.1932 (*G. E. J. Nixon*), Boxhill, 8.vi.1930 (*Nixon*); Hants South, Brockenhurst, 24.vi.1924 (*J. J. F. X. King*) (G.), New Forest, Matley Bog, 3 ex., 13.vi.1907 (M.) (these specimens are variable; in one the head is less punctured, in the second the legs are more yellow and the propodeal area is better defined, in the third the area is better defined); Scotland, Sutherland, Bonar Bridge, 2 ex. (*P. Cameron*) (B.M.) (one det. as *A. triangularis* Kieff.); Inverness East, Nethy Bridge, 29.vi., 1.vii., 8.vii.1922 (*J. J. F. X. King*) (G.), Loch Morlich, 24.vi.1934 (*R. B. and J. E. Benson*) (B.M.); Argyll, Glen Lean, 8.vi.1925 (*J. J. F. X. King*) (G.), Claddich (*P. Cameron*) (B.M.) (det. as *A. vulgaris* var. *trivialis* Kieff.); Dumfries, Gretna, 26.vi.1936 (*J. Murray*); Ireland, Wicklow, Glen of Imaal, Ballmeddin, 23.vii.1928 (*A.W.S.*); East Meath, Ballina, 12.vi.1936 (*A.W.S.*); Armagh, Kinnegoe, 17.vi.1937 (*A.W.S.*); Britain, 4 ex. (Walker coll.) (B.M.) (2 det. as *penidas* and 2 as *alorus*); no data, 1 ex. (Desvignes coll.) (B.M.) (det. as *inclytus*), 2 ex. (H.W.), 2 ex. (Haliday coll.) (D.).

I have also seen the types of *Dryinus tenuicornis* Dalman and of *Dryinus fuscipes* Thomson kindly sent from Stockholm by Dr. A. Roman; further, a ♂ Austria (*Giraud*) (P.) and a probable ♂ (genitalia not examined) France, Landes, Biscarosse, 24.vi. (*de Gaulle*) (P.).

I am strongly of the opinion that the male *A. alorus* corresponds to the females *A. ephippiger* var. *collare* (see p. 235), but I have kept the records separate until more definite proof is available.

Anteon (*Chelogynus*) *albidocolle* (Kieffer).

Anteon albidocollis Kieffer, 1905.

♀. Head and antennae yellow, mandibles white, eyes and a small spot posterior to the furrow connecting eye to mandibular articulation, black; pronotum very pale yellow, dorsally almost white; mesonotum reddish-testaceous, scutellum, metanotum ("post-scutellum") and mesopleuron black; propodeum black; abdomen reddish-yellow with a small anterior spot on petiole and last three or four segments black; legs pale yellow, fore femora distally whitish; tegulae white. Wings hyaline, pterostigma and veins very pale yellow. Surface with very sparse pale hairs. Length 2·0 mm.

Structurally very close to *A.* (*C.*) *lucidum* (Hal. *in* Curt.) (below), but differs as follows: head, in dorsal view, a little broader, vertex between the eyes with sides less convergent anteriorly, posterior raised, margin straighter; vertex smooth and shining posteriorly quite unpunctured and not at all shagreened, even anteriorly with few indefinite punctures; no central keel, lateral keels very weak; posterior ocelli removed from occiput by only a little more than half the POL. Pronotum a little shorter, very sparsely punctured, part behind the transverse row of punctures very thin and hyaline, bottom of lateral impression hardly striate; notaulices shallower.

♂. Unknown.

Specimens examined ♀♀: Dorset, Lulworth, 1891 (H.D.); no data, 2 ex. (H.D.). The species was described by Kieffer (1905 : 157) from females captured at Trieste, Volosca, v.; I have recognised it from the description only.

A. albidocolle has a very distinctive colour-pattern, but in structure it is very close to *A.* (*C.*) *ephippiger* (Dalm.). It differs in the still more effaced sculpture and the broader head with the ocelli lying nearer the occiput, but these are characters requiring careful comparison to appreciate. From *A.* (*C.*) *lucidum* (Hal. *in* Curt.) it differs in sculpture still more clearly. From *A.* (*C.*) *fulviventre* (Hal. *in* Curt). the shining head and longer antennal segments clearly differentiate it.

Anteon (*Chelogynus*) *lucidus* (Haliday *in* Curtis).

♀ *Dryinus lucidus* Haliday *in* Curtis, 1828.
♂ *D. penidas* Walker, 1837. **syn. n.**
♂ *Anteon vulgaris* Kieffer, 1905. **syn. n.**
? ♀ *A. longitarsis* Kieffer, 1906.
♂ *Antaeon breviventralis* Chitty, 1908 : 144. **syn. n.**
♀ *A. delicatulus* Chitty, 1908 : 255. **syn. n.**

♀. Black; palps, mandibles, antennal segment 1, legs (except sometimes small distal mark on hind coxae and distal patch on hind femora), and tegulae, whitish-yellow; antennal segment 2 light brown or pale yellow, 3–10 light brown to black. Wings hyaline, pterostigma and veins yellow. Body (except abdomen) covered with rather sparse outstanding pale hairs. Length 2·0–2·8 mm.

Eyes almost bare, a few hairs visible under high magnification; head, in dorsal view (including eyes), about twice as broad as long; vertex between eyes about one and two-

thirds times as long as broad, sides converging, posteriorly with a regularly and moderately strongly curved raised margin, the anterior side of which is scarcely crenate; antennae thin, very little thickened distally, with segment 1 distinctly curved, three and a half times as long as broad, longer than 3 but considerably shorter than 2 + 3, 2 a little pyriform, a little more than twice as long as broad, as long as 7, 3 distinctly thinner than 2, a little longer than 4, four times as long as broad, 4–9 gradually decreasing in length but only increasing a little in thickness, 4 a little more than three times, 9 a little more than twice as long as broad, 10 as long as 3; vertex shining, rather finely punctured, punctures quite close in front but very sparse in region of ocelli, lateral keels running from antennal sockets hardly traceable, central keel from mid ocellus very short and weak, no curved impressions at sides of posterior ocelli; ocellar triangle equilateral, POL : OOL between 1 : 1 and 3 : 4, lateral margins of head behind eyes a little longer than OOL, posterior ocelli removed from occiput by a distance as great as or a little greater than POL. Pronotum as long as broad, sides only a little divergent behind, in profile flat and sloping down very little to anterior margin, surface shining, disc distinctly and moderately closely punctured (rarely punctures much sparser, in small specimens), posterior half much more sparsely and crossed a little in front of smooth posterior margin by a curved row of elongate punctures, a strip across anterior fifth dull and rugose, pronotum in lateral view not strongly impressed, rather dull and rugose, with bottom of impression more shining and crossed by a few striae; mesonotum clearly shorter than pronotum, shining, sparsely punctured, notaulices deep but not well defined, extending across half its length; scutellum shining, unpunctured, with a transverse row of punctures just before posterior margin; metanotum ("postscutellum") with a large smooth central area; mesopleuron anteriorly dull and finely rugose, postero-dorsally dull and coarsely rugose, postero-ventrally with a smooth, almost unpunctured area; meso-metapleural suture weakly crenate; metapleuron shining, feebly rugose; propodeum with dorsal surface rather less than half as long as posterior, anterior transverse furrow hardly developed, surface moderately shining, rather coarsely rugose, posterior face with a very feebly defined area which is more than twice as long as broad, surface of area sculptured like parts outside it, rarely distinctly more finely. Abdomen smooth and shining. Fore legs with segment 1 two-thirds as long as 4, 2 obtusely produced proximally, articulating part of 5 as long as 1, free part nearly half as long again as 4, 5 with one row of about 20 small, lanceolate lamellae and two rows of bristles, in addition with a discontinuous distal group of 5–6 lamellae. Fore-wings with distal section of radial vein one-third proximal.

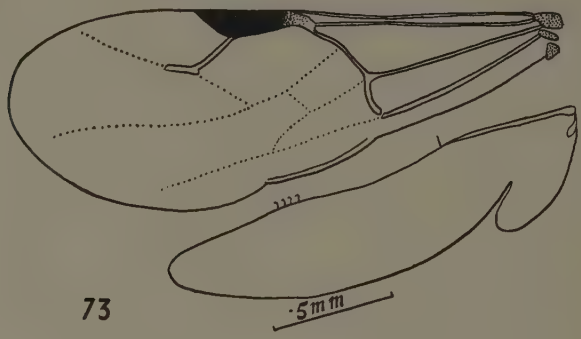
♂. Very close to *A.* (*C.*) *ephippiger* (Dalm.) (p. 268) but differs as follows: mandibles varying from pale yellow to nearly black; antennal segment 1 sometimes brown, sometimes nearly yellow; four hind femora often brown, rarely approaching yellow; rather larger, length 2·5 mm.

Head often rather more strongly and closely punctured, but sculpture variable; antennae shorter and thicker, segment 4 not more than three times as long as broad, actual proportions of segments varying a little; mesonotum often rather more punctured posteriorly; propodeum more as in *A.* (*C.*) *fulviventre* (Hal. *in* Curt.) (p. 265), with distinct central area on posterior surface, ninth sternite (fig. 74); genitalia (fig. 75) with distal inner process of gonoforceps larger [20] and with its tip more acute. In some specimens the distal part of radial vein may be one-half (or rather more) as long as proximal part.

Specimens examined ♀♀:—Westmorland, near Barras, 5 ex. (two at grass-roots and three on windows of motor car), 5.vii.1936 (*O.W.R.*) (one with pterostigma brownish; one with antennae 8–10 distinctly paler; one with head more finely and sparsely punctured than usual); Yorks North West, Swaledale, Keld at grass-roots, 2 ex. 9.vii.1936 (*O.W.R.*); Yorks Mid West, Ingleton at

[20] According to viewpoint and especially according to pressure in mounted specimens, the size and shape of the process vary.

grass-roots, 1.vii.1936 (*O.W.R.*); Staffs, Maer Woods, 22.vi.1935 (*H. Britten*) (B.) (very small, head, pronotum, and legs punctured), Leak, Morredge moorland, ca. 1500 ft., 20.vii.1938 (*H. W. Daltry*); Norfolk East, Ranworth Broad, 15.vi.1901 (*A. J. Chitty*) (M.) (type of *Anteon delicatulus* Chitty, 1908; it is



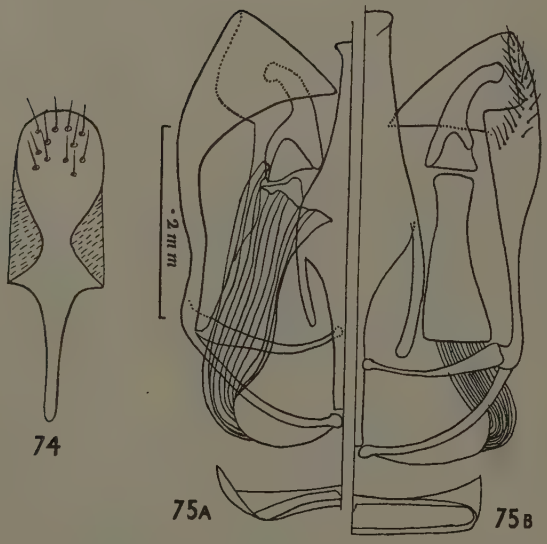


Fig. 73.—Left wings of *Anteon* (*Chelogynus*) *lucidum* (Hal. *in* Curt.) ♀.
Fig. 74.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 75.—Same species, genitalia, (a) dorsal, (b) ventral view ♂.

doubtful whether this name is valid owing to the brevity of the description); Gloster West, Wotton-under-Edge, 1907 (*R. C. L. Perkins*) (B.M.); Bucks, Slough on birch, 7.vi.1932 (*O.W.R.*), at grass-roots, 18.vi.1935 (*O.W.R.*); Herts, St. Albans (F.): Surrey, Boxhill, 8.vi.1930 (*G. E. J. Nixon*), Leather-

head on willow, 23.vi.1928 (*O.W.R.*); Dorset, Glanvilles Wootton (C.); Devon North, Croyde, vi.–vii.1927 (*K. G. Blair*) (Bl.), Barnstaple (F.); Scotland, Ross West, Gairloch, 3.vii.1934 (*O.W.R.*); Dumfries, Gretna, Nutberry, 25.vi.1931 (*Jas. Murray*), Gretna, 2.vii.1935 (*Jas. Murray*); Ireland, Wicklow ? (*Haliday*) (D.); Dublin, Portmarnock (*Haliday*) (D.), The Slade of Saggart, 22.vii.1936 (*A.W.S.*), Portrane, 25.viii.1926 (*A.W.S.*) (very small, head punctured in front only); Wicklow, Poulaphuca, 21.vi.1929 (*E. O'Mahoney*) (A.W.S.); England, 2 ex. (*Haliday*) (D.); British, 2 ex. (*Haliday*) (D.), 1 ex. (Ca.); no data, 2 ex. (H.W.), 1 ex. (*Desvignes*) (B.M.), 2 ex. (*Stephens*) (B.M.) (one labelled " *Gonatopus gracilis* Westw:", the other labelled " *Dryinus rapax* "), 1 ex. (H.D.) (vertex very little punctured posteriorly).

The type of *Dryinus lucidus* Haliday *in* Curtis is probably a ♀ specimen in the Haliday collection at Dublin (in collection 2 of my paper, 1935 : 145). There is also a specimen of the same species standing under *D. lucidus* in Curtis' collection at Melbourne.

♂♂: Type of *Dryinus penidas*, " Britain " (Walker coll.) (B.M.) (*see* Richards, 1935 : 151); Yorks North West, Swaledale, Keld at grass-roots, 9.vii.1936 (*O.W.R.*); Yorks Mid West, Ingleton at grass-roots, 3 ex., 1.vii.1936 (*O.W.R.*), nr. Ripon at grass-roots, 3.vii.1936 (*O.W.R.*); Lincs North, Louth, vi.1912 (M.); Norfolk East, Horning, 15.vi.1922 (M.); Suffolk West, Brandon, 2 ex., 22.vi.1914 (M.); Cambs, Gogmagogs, 2 ex., 1.vii.1917 (*G. T. Lyle*) (M.), Cambridge, Ent. Field Lab., Storeys Way, 4.vii.1934 and 3.vii.1936 (*G. C. Varley*) (Ca.), " Cambs," 16 ex. (H.W.); Gloster West, Wotton-under-Edge, 1907 (*R. C. L. Perkins*) (B.M.); Bucks, Slough, 28.vi.1938, on cabbage, 29.vi.1932 (*O.W.R.*); Essex, Epping (F.); London, Battersea Fields, vi.1820 (*A. Ingpen*) (H.W.); Kent West, Eynsford, 24.vii.1932 (*G. E. J. Nixon*); Kent East, Walmer, 24.vi.1904 (*A. J. Chitty*) (M.) (type of *Anteon breviventralis* Chitty); Surrey, Combe Wood (*R. Lewis*) (H.W.), Ashtead, vi.1930 and 3 ex., 3.vii.1932 (*G. E. J. Nixon*), Boxhill, 16.vii.1932 (Bl.), Richmond Park, vi. and 4.vii.1835 (H.W.); Hants South, New Forest, Fidley, 2 ex., 23.vi. 1934 (M.), Bucklers Hard, 4.vii.1934 (M.), Brockenhurst, 9 ex., 25–30.vi.1933 (*G. E. J. Nixon*); Dorset, Glanvilles Wootton, vi.1899 (H.D.); Devon North, Braunton, vi.1931 (Bl.), Barnstaple (F.); Scotland, Caithness, Dunnet Bay, 2 ex., 21.vi.1934 (*R. B. & J. E. Benson*) (B.M.); Inverness East, Aviemore, 26.vi.1934 (*R. B. & J. E. Benson*) (B.M.); Argyll, Mull (*P. Cameron*) (B.M.) (det. as *A. vulgaris* Kieff.); Dumbarton, Peaton, 14.vii.1938 (*A.W.S.*); Lanark, Clydesdale (*P. Cameron*) (B.M.) (det. as *A. vulgaris* Kieff.); Dumfries, vi.1938, 2 ex. (*P. Cameron*) (B.M.) (one the type of *A. vulgaris* Kieff., *see* Richards, 1936 : 466); 4 ex., Gretna, 10.vi.1938, 12.vii.1937, 8. and 16.vii.1936, Nutberry, 22.vii.1936 (*Jas. Murray*); " Scotland," 1 ex. (*P. Cameron*) (B.M.) (det. as *A. vulgaris* Kieff.); Ireland, Sligo, Trewalua, 2 ex., 8.vii.1936, 1 ex., 25.vi.1936 (*A.W.S.*), Streedagh, 9.vii.1936 (*A.W.S.*), Castlegal, 27.vi.1936 (*A.W.S.*); West Meath, Riversdale, 3 ex., 20.vi.1937, Carne, The Mullet, 19.vi.1936 (*A.W.S.*); Meath, Ratoath, 13.vii.1937 (*A.W.S.*); Leitrim, Tullaghan, 10. and 12.vii.1936 (*A.W.S.*); Louth, Termonfeckin, 2. and 9.vii.1933 (*A.W.S.*); Queens County, Pontarlington, 4 ex., 26.vii.1936 (*A.W.S.*); Wicklow, Glenmalur, 7.vii.1937, Athdown, 30.vi.1929 (*A.W.S.*); Wexford, Curracloe, 20.vii.1937 (*A.W.S.*); Kilkenny, 16.vi.1923 (*R. A. Phillips*) (A.W.S.); Kerry South, Dunkercon, 3.vii.1935 (*A.W.S.*); " Ireland " (*A. H. Haliday*) (Walker coll., B.M.) (det. as *A. penidas* Walk.); no data,1 ex. labelled " *Antaeon atriceps* Hal. ms.," 1 ex. labelled " *Gonatopus tenuicornis* Dal." (Stephens coll.), 19 ex. labelled " *Gonatopus scapularis* " (Stephens coll.), 1 ex. (F. Smith coll.), 2 ex. labelled

"*A. divisus*" (*P. Cameron*) (B.M.); "Britain," 15 ex. (Haliday coll.) (D.), 16 ex. (H.D.), 5 ex. (H.W.), 2 ex. (one labelled "*pubicornis*") (*Marshall*) (coll. André) (P.).

I have also examined ♂♂: Germany, R. Neckar, Hirschhorn, vii.1930 (*G. E. J. Nixon*); Austria, 1 ex. (*Giraud*) (P.), Wien, Prater, 3 ex., Wien, Schneeberg, 1 ex., Reichenau, 2 ex. "Gast."; 1 ex. France, Maisons-Lafitte (*de Gaulle*) (P.), 1 ex. 25.v. (head a little alutaceous), 23.vi., 3.vii., 2 ex., 7.vii., 2 ex., 9.vii., 1 ex., no date. I think it very probable that *Anteon penidas* (Walk.) is the male of *A.* (*C.*) *lucidum* (Hal. *in* Curt.), but I have kept the records separate until this is proved. Possibly *Chelogynus serratus* Maneval, 1935 (♀) will prove to be another synonym.

Anteon (*Chelogynus*) *kiefferi* Chitty.

Antaeon kiefferi Chitty, 1908.
Chelogynus angusticollis Berland, 1928 *nec* Ogloblin, 1924. **syn. n.**
C. berlandi Richards, 1936. **syn. n.**

♀. Black; palps, mandibles, antennal segment 1 (except sometimes distal extremity), legs except most of hind coxae and more or less extensive distal portion of hind femora, and tegulae, yellow; antennal segment 2 more or less brown. Wings hyaline, sometimes a little darkened distally, pterostigma brown, proximally whitish, veins pale yellow. Body (except abdomen) with rather numerous outstanding white hairs. Length 3·5 mm.

Eyes almost bare; head, in dorsal view (including eyes), nearly twice as broad as long; vertex between eyes about one and three-quarter times as long as broad; sides only a little convergent in front, posteriorly with a very feebly curved, raised margin of which anterior side is crenate; antennae rather long, moderately thickened, segment 1 a little curved and distally thickened, not quite four times as long as broad, only a little shorter than 2 + 3, 2 elongate-pyriform, two and a half times as long as broad, nearly as long as 9, 3 a little thinner than 2, a very little longer than 4, three and a half times as long as broad, 4–9 increasing gradually in thickness and decreasing very gradually in length, 4 not much more than three times, 9 not quite twice as long as broad, 10 as long as 3; vertex not very shining, finely alutaceous, anteriorly closely, subconfluently but very shallowly punctured, centrally with very few punctures or rugosities, posteriorly (especially behind level of ocelli) with an irregular network of weak rugosities; lateral keels running from antennal sockets (towards and along inner orbits) rather distinct, central keel from mid-ocellus also strong; no curved impressions at sides of posterior ocelli; ocellar triangle equilateral, POL : OOL as 1 : 1, lateral margins of head behind eyes distinctly longer than OOL, posterior ocelli removed from occiput by a distance about one-third greater than POL. Pronotum about as long as broad or a little longer, sides hardly divergent behind, in profile flat and sloping down very little to anterior margin, surface dull, anterior three-quarters transversely rugose with some shallow punctures amongst rugosities, interstices finely alutaceous, posterior quarter delineated by a curved transverse row of elongate punctures (sometimes so long as almost to form radiating striae), surface behind this row smooth and shining; pronotum in lateral view strongly impressed, impression shining, crossed by strong striae; mesonotum clearly shorter than pronotum, moderately shining, in one specimen rather distinctly, in other very feebly alutaceous, with scattered large punctures (more numerous in front), notaulices very short, crenate; scutellum shining, almost unpunctured, with strong crenate line before posterior margin; metanotum ("postscutellum") with even central area somewhat rugose, though still shining; mesopleuron anteriorly dull, densely and rugosely punctate, postero-dorsally coarsely rugose, postero-ventrally with a small smooth area much encroached on by rugosities; meso-metapleural suture strongly crenate; metapleuron rugose above, striate below; propodeum with dorsal surface half as long as

posterior, anterior transverse furrow deep and strongly crenate, surface moderately shining, strongly rugose especially anteriorly, posterior surface with a large area well defined by keels which are stronger where they meet above, area more than twice as long as broad but broadening upwards, surface only a little more finely rugose than other parts. Abdomen smooth and shining. Fore legs with segment 1 hardly two-thirds as long as 4, 2 obtusely produced proximally, articulating part of 5 (fig. 76) hardly as long as 1, free part more than half as long again as 4, 5 with two rows of lamellae which are large and expanded at apex distally but are smaller, closer set and lanceolate proximally, about 30 in all, one row of bristles and a distal more or less discontinuous group of 8–12 lamellae. Fore-wings with distal section of radial vein one-third proximal.

♂. Unknown.

Specimens examined ♀♀: type, no data on specimen but according to original description, Suffolk East, Ipswich (M.); Oxon, near Henley, 10.vi.1934 (*O.W.R.*) (*see* Richards, 1936 : 169); France, Maisons-Lafitte (*de Gaulle*) (P.) (type of *Chelogynus angusticollis* Berland).

Berland's type is similar to the Henley specimen but the head is a little more shining and less alutaceous; there are the same irregular rugosities behind the ocelli. It is possible that *Anteon tricarinatus* Kieffer, 1906, described from England, is an earlier name for this species. The type, however, appears to be lost and the description disagrees in a number of points.

Anteon (*Chelogynus*) *cameroni* Kieffer.

Anteon cameroni Kieffer, 1905.

♀. Black; palps, mandibles, antennal segments 1–2, prothorax, legs except with small distal portion of hind femora, and tegulae yellow; antennal segment 3, rarely also 4, more or less brown, rarely almost yellow; segment 5 of four hind tarsi brown. Wings hyaline, distally clouded, pterostigma and veins pale brown. Body (except abdomen) covered with sparse outstanding pale hairs. Length 2·5–3·5 mm.

Eyes almost bare; head, in dorsal view (including eyes), twice as broad as long; vertex between eyes one and a half times as broad as long, sides a little convergent in front, posteriorly with a distinctly curved raised margin of which anterior side is very weakly crenate; antennae rather short and distinctly thickened, segment 1 rather strongly curved, not much more than three times as long as broad, a little shorter than 2 + 3, 2 elongate-pyriform, twice as long as broad, as long as 9, 3 a little thinner than 2, distinctly longer than 4, three and a half times as long as broad, 4–9 gradually decreasing in length and increasing considerably in thickness, 4 three times, 9 not quite twice as long as broad, 10 a little longer than 3; vertex shining, distinctly punctured, closely so in front but only sparsely behind, lateral keels running from antennal sockets (towards and along inner orbits) weak but traceable, central keel from mid ocellus almost obsolete, no curved impressions at sides of posterior ocelli; ocellar triangle equilateral, POL : OOL about as 1 : 1, lateral margins of head behind the eyes as long as OOL, posterior ocelli removed from occiput by a distance as long as or hardly longer than POL. Pronotum not quite as long as broad, sides hardly divergent behind, in profile flat and sloping down very little to anterior margin, surface shining, moderately coarsely but not very closely punctured (punctures become much closer on anterior quarter); rarely whole pronotum is almost without punctures, posterior fifth smooth and unpunctured but not very sharply defined; pronotum in lateral view only very weakly impressed, impression shining, crossed by a few keels; mesonotum clearly shorter than pronotum, shining, with moderately numerous shallow punctures (fewer behind), notaulices very short; scutellum shining with a few punctures, crossed by a weak crenate

line before posterior margin; metanotum (" postscutellum ") usually with central area dull and rugose, rarely entirely or mainly smooth and shining; mesopleuron anteriorly dull, finely rugosely punctate, postero-dorsally rather finely rugose, postero-ventrally rather finely punctured; meso-metapleural suture strongly crenate; metapleuron finely rugose;

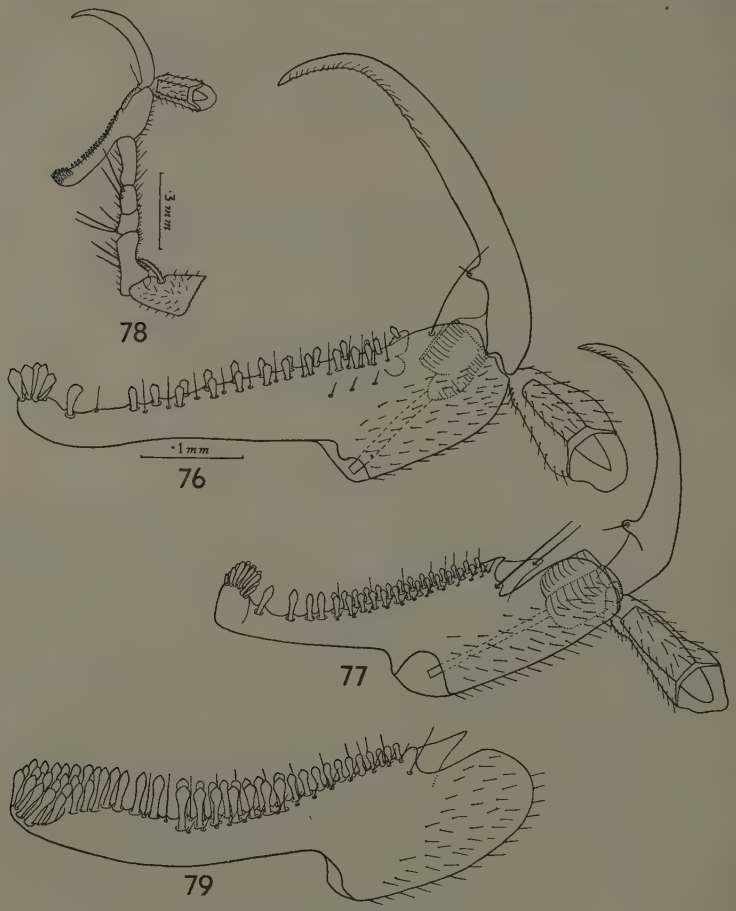


Fig. 76.—Chela of *Anteon* (*Chelogynus*) *kiefferi* Chitty ♀.
Fig. 77.—Chela of *A.* (*C.*) *cameroni* Kieff. ♀.
Fig. 78.—Fore tarsus and chela of *A.* (*C.*) *gaullei* Kieff. ♀.
Fig. 79.—Same species, chela ♀ (claw omitted).

propodeum with dorsal surface half as long as posterior, anterior transverse furrow deep and strongly crenate, surface rather dull and strongly rugose, posterior surface with a not very strongly defined area, about twice as long as broad, but sides diverging upwards, surface only a little more finely rugose than parts outside it. Abdomen smooth and shining. Fore

legs with segment 1 as long as or a little longer than 4, 2 obtusely produced proximally, articulating part of 5 (fig. 77) as long as 1, free part one and two-thirds times as long as 4, 5 with two rows of about 30 lamellae which are moderately long and somewhat expanded distally, two rows of bristles, and a distal more or less discontinuous group of about 10 lamellae. Fore-wings a little shortened, not reaching beyond end of tergite 2, distal section of radial vein usually about one-half proximal.

♂. Very close to *A.* (*C.*) *fulviventre* (Hal. *in* Curt.); similar in colour but larger, length 2·2 mm.; antennae longer and thinner, segment 4 fully four times as long as broad; propodeal area moderately distinct; genitalia with distal inner process of gonoforceps large, as in *A.* (*C.*) *lucidum* (Hal. *in* Curt.) but tip less acute.

Specimens examined ♀♀: Scotland, Dumfries, Thornhill (*P. Cameron*) (B.M.) (type of *Anteon cameroni* Kieff.); Yorks North East, Lastingham (F.); Yorks Mid West, Ingleton at grass-roots, 2 ex., 1.vii.1936 (*O.W.R.*); Staffs, Leek, Morredge, 20.vii.1938 (*H. W. Daltry*); Cheshire, Delamere, 1.vii.1934 (*H. Britten*) (B.); Norfolk East, Catfield, 16.vii.1920 (*J. J. F. X. King*) (G.); Oxon, Shotover, 22.vii.1916 (*A. H. Hamm*) (H.); Berks, Windsor Forest, vii.1931 (*H. St. J. K. Donisthorpe*) (B.M.); Hants South, Brockenhurst (Ca.); Dorset, Glanvilles Wootton, 23.vii.1901 (H.D.); Devon North, Braunton, vi.1931 (*K. G. Blair*) (Bl.) (hind femora entirely yellow); Scotland, Inverness West, Glenelg on sandy bank, 28.vi.1934 (*O.W.R.*); Dumbarton, Fanslane, 10.vii.1938 (*A.W.S.*); Dumfries, Gretna, 15.vii.1936 (*J. Murray*); no data, 1 ex. (Stephens coll., labelled "*collaris*") (B.M.) (antennal segment 4 brown, pronotum hardly punctured, abdominal segments 1–2 brownish), 2 ex. (H.W.) (one with antennal segment 4 brownish, the other with very few punctures on pronotum), 1 ex. (H.D.) (pronotum almost unpunctured, 1 ex. (Haliday coll.) (D.), 1 ex. (*Marshall*) (coll. André) (P.); Austria?, 1 ex. (*Giraud*) (P.). ♂♂: no data, 1 ex. (M.) (labelled, possibly correctly (cf. p. 235), ? *C. cameroni*; Dumfries, Gretna, 6.vii.1938 (*J. Murray*) (head somewhat alutaceous, distinctly punctured).

Anteon (*Chelogynus*) *gaullei* Kieffer.

Dryinus collaris Walker 1837, *nec Gonatopus collaris* Dalman, 1818.
D. dorsalis Thomson, 1860, *? nec* Nees, 1834, etc. **syn. n.**
Anteon gaullei Kieffer, 1905 : 161.
A. maculipennis Kieffer, 1905 : 164. **syn. n.**

Extremely close to *A.* (*C.*) *cameroni* but differing as follows:—

♀. Antennal segments 1–6 pale, 1–2 yellow, others often brownish; vertex often very weakly shagreened, at least in part; posterior ocelli usually distinctly further removed from occiput than POL; pronotum usually less punctured, often almost unpunctured; segment 5 (fig. 78) of fore tarsi with the distal group consisting of about 20 lamellae. Length 3·0–4·0 mm.

♂. Unknown.

Specimens examined ♀♀: Type and paratype "British," *Dryinus collaris* Walker, 1837 = *A. gaullei* Kieffer, 1905 (D., coll. no. 4, *cf.* Richards, 1935 : 145); Norfolk (Bridgman) (H.D.); Herts, St. Albans (F.); Surrey, Coombe Wood, 18.vii.1834 (*J. O. Westwood*) (H.W.); Berks, Tubney, 1.vii.1906 (*A. J. Chitty*) (M.); Hants South, Brockenhurst, 1.viii.1924 (*J. J. F. X. King*) (G.); no data, 1 ex. (H.D.), 1 ex. 7.vii.1897 (M.), 1 ex., swept *Fumaria*, 5.vii.1899 (M.), 1 ex. (M.).

Also 1 ex. "Via Gellia," 4.vii.1935 (M.); France, "Pyrenees" (F.), forêt de

St. Germain, 2.vii.1885 (*de Gaulle*) (P.); no data, 1 ex. (*Sichel*) (P.); Austria, Wien (*Giraud*) (P.), Graz, 24.vi. (*Giraud*) (P.).

Dalman's *Gonatopus collaris*, 1818 (*Dryinus collaris*; 1823) is a variety of (*A.*) (*C.*) *ephippiger* (Dalm.) (see p. 268). The specimens described by Haliday *in* Walker (1837) as *D. collaris* are preserved at Dublin and form the types of Kieffer's *Anteon gaullei*.

Thomson (1860) described a *Dryinus dorsalis* which he thought was the same as *Bethylus dorsalis* Fabricius, [1805] and *D. dorsalis* Nees, 1834. It is certainly different from the supposed type of the former (see p. 263) and possibly from the latter, so Kieffer re-named it *Anteon maculipennis*. I have examined a specimen of *Dryinus dorsalis* Thomson kindly sent from Stockholm by Dr. A. Roman. It is the same as *A.* (*C.*) *gaullei* but does not altogether agree with Thomson's description (1860 : 177) since the pronotum is yellow, whereas it should, at least by inference, be black. Nevertheless, the description agrees so well in other respects, and the mention of varieties with short wings and only the first two segments of the antennae yellow agrees so well with *A.* (*C.*) *cameroni* (very closely allied to *A.* (*C.*) *gaullei*), that I think the specimen sent must really be one of the type-series.

8. The British Aphelopinae.

The single genus which forms this subfamily is usually regarded as an aberrant member of the Dryinidae. In spite of the absence of a modified fore tarsus in the female, the general structure is similar. The wing-venation, however, is more reduced and the male genitalia differ to some extent, particularly in showing no trace of the proximal processes from the gonoforcipes.

The resemblances in the biology of the two groups are less marked than appears at first sight. The Dryininae attack Fulgoroidea or Jassidae; the egg and young larva are always near the surface of the host, and at an early stage the larva projects in a sac, which is composed of larval skins. The species of *Aphelopus* attack Jassidae subf. Typhlocybinae except for the remarkable *A. theliae* Gahan (see below) which attacks a Membracid. The peculiar feature of most *Aphelopus* is that the egg and at least first-stage larvae are much more internal and the latter is surrounded by a peculiar hypertrophied mass of host-tissue (Keilin and Thompson, 1915; Fenton, 1918). In the second instar it breaks out of this mass and projects in a sac composed of larval skins. The appearance of the sac is very different from that of a Dryinid. It always projects from the anterior part of the abdominal pleura and lies along the side of the abdomen; it is cylindrical with its distal end rounded and of a much softer texture than in Dryinines. The sacs of the latter are always black or dark brown. In England, the sacs of *Aphelopus* vary in colour from yellowish to nearly black. It is probable that some of the species of *Aphelopus* described below differ in this character, but it is not yet possible to classify the sacs.

Gahan (1918) described *Aphelopus theliae* which attacks the Membracid, *Thelia*. No very remarkable structural features of the adult parasite were recorded, though the larval history is totally distinct (Kornhauser, 1919). The egg laid by the female divides up by a process of polyembryony and gives rise to 50–70 young larvae. These develop entirely internally, no sac being produced, and the mature larvae bore their way through the abdominal sternites of the host and pupate in the ground.

Aphelopus Dalman, 1823.[21]

Fore tarsi of female not chelate. Fore-wings (fig. 80) with only one closed cell (the costal cell) and a short radial vein arising from the large pterostigma; Sc + R + M strongly thickened just before the pterostigma. Male genitalia without proximal processes from the gonoforcipes.

Genotype (fixed by Westwood, 1840) = *Dryinus* (*Aphelopus*) *atratus* Dalman, 1823.[22] The genus is known from Europe, U.S.A. and C. America.

Key to the British species of Aphelopus *Dalman.*

1. Head with only mandibles pale. Antennae with segment 3 about two-thirds as long as 9 . . . . . 2.
–. At least clypeus mainly pale . . . . . 3.
2. Antennae with segment 3 about as long as 2, 10 shorter than 3 + 4. Ninth sternite not emarginate with 10–19 long bristles.
   Parameres of male genitalia distally tridentate with four bristles; basivolsella with outer process shorter, inner process with two strong bristles; distivolsella strongly curved, with 3–4 distal teeth *A. holomelas* sp. n. p. 289.
–. Antennae with segment 3 one and a half times as long as 2, 10 as long as 3 + 4. Ninth sternite with its sides converging distally, shallowly emarginate with 27–38 bristles. Parameres of genitalia distally trumpet-shaped with four small bristles; basivolsella with inner and outer processes of equal length, inner with two strong bristles; distivolsella sinuate, distally almost untoothed . . . *A. nigriceps* Kieffer. p. 291.
3. Head pale marked above clypeus, at least round antennal insertions. Antennae with segment 3 two-thirds to half as long as 9, one and a half times as long as 2, 10 as long as, or longer than, 3 + 4. Ninth sternite with its sides a little converging, distally moderately emarginate with 19–29 bristles. Parameres of genitalia with sides strongly convergent, distally without teeth or bristles; basivolsella with outer process rather shorter and much narrower than inner one which has one strong bristle; distivolsella moderately curved, not toothed distally
   A. melaleucus (Dalman). p. 280.
–. Head with only clypeus pale. Antennae with segment 10 shorter than 3 + 4 4
4. Antennal segment 3 as long as 6 which is three times as long as broad, 9 as long as 3. Ninth sternite with sides nearly parallel, distally very deeply emarginate with 28–64 bristles. Parameres of genitalia with sides strongly convergent, distally with feeble lateral processes and no bristles; basivolsella with no inner process, outer process long, spine-like, with two strong bristles; distivolsella long straight, distally serrate externally
   A. serratus sp. n. p. 284.
   Antennal segment 3 shorter than 6 which is at least four times as long as broad. Ninth sternite distally shallowly emarginate with 16–18 bristles. Parameres of genitalia distally with strong lateral processes and four bristles; basivolsella with inner process broader but little longer than outer process, bearing one strong bristle; distivolsella sinuate, proximal part much longer than distal which is untoothed . . . . . 5.

[21] Dalman originally described *Aphelopus* as a subgenus of *Dryinus*.

[22] The type of *Dryinus atratus* Dalman is at Stockholm, and Mr. J. F. Perkins tells me that it is now headless. Unless it proves to be a male and the genitalia are examined, it will probably be impossible to identify it. It is not usually possible even to sex a headless *Aphelopus* without dissecting the abdomen.

5. Antennal segment 6 four times as long as broad. Clypeus pure white. Sides of ninth sternite more parallel. Parameres of genitalia truncate distally; distivolsella proximally straight, distally moderately curved. Non-British. . . . . (*A. heidelbergensis* sp. n. p. 286.)
–. Antennal segment 6 five times as long as broad, 3 three-quarters as long as 9. Clypeus dirty white, dorsal half often more or less pitchy. Sides of ninth sternite more or less strongly convergent. Parameres of genitalia more emarginate distally; distivolsella proximally straight *A. camus* sp. n. p. 287.

♀♀.

(The female of *A. camus* sp. n. is not yet recognised.)

1. Head with U-shaped white mark above antennae; antennae often considerably or even entirely white. Front part of vertex with at most very weak punctures. Antennal segment 6 hardly longer than 7 *A. melaleucus* (Dalman). p. 280.
–. Head above antennae black . . . . . 2.
2. Clypeus white . . . . . 3.
–. Clypeus black. Antennal segment 6 clearly longer than 7 . . . . . 4.
3. Antennae very long, segment 5 three times as long as broad, 6 longer than 7. Head very weakly punctured. Non-British (*A. heidelbergensis* sp. n. p. 286).
–. Antennae shorter, segment 5 two and a half times as long as broad, 6 about as long as 7. Head more distinctly punctured *A. serratus* sp. n. p. 284.
4. Size a little larger. Antennal segments 1–2 sharply pale, segments all a little longer. Clypeus usually more truncate. Head usually rather distinctly punctured . . . . . *A. nigriceps* Kieffer. p. 291.
–. Size a little smaller. Antennal segments a little shorter, segments 1–2 often brown, or only segment 1 yellow, very rarely both 1 and 2 pale yellow. Clypeus with distal margin curved. Head not so distinctly punctured *A. holomelas* sp. n. p. 289.

I found it impossible to segregate the species of *Aphelopus* until I studied the male genitalia where there are excellent specific characters. At least one male from every locality was dissected. The differences in the proportions of the antennal segments are subject to some variation and it is usually best to examine the genitalia as well. The colour of the head, so far as it goes, seems to be quite reliable as a specific character. It is possible that a few of the females attributed to *A. serratus* may really belong to *A. camus* but, if so, I cannot separate them. Kieffer described a number of species of *Aphelopus* which are unrecognisable from the descriptions; the types of two of them (*A. melaleucus* var. *indivisus* Kieffer, 1905 and *A. m.* var. *carinatus* Kieffer, 1905) are lost (Richards, 1936a : 465) and no purpose would be served by attempting to recognise them. Some of his species described from continental specimens may well be the same as some described in the present paper, but the types will have to be studied to decide. *Dryinus* (*Aphelopus*) *atratus* Dalman, 1823, is also likely to be an earlier name for one of my species.

Aphelopus melaleucus (Dalman).

Gonatopus melaleucus Dalman, 1818.

♂. Black; palpi, mandibles (except reddish tips), clypeus (except very narrow ventral margin), two irregular spots between antennal sockets, a spot on each side between antennal sockets and eyes, white; antennal segments 9–10 brownish; fore coxae largely whitish, fore

femora brown (distal quarter, even more ventrally, whitish), fore tibiae and tarsi white; mid coxae black, distally whitish, mid femora brown streaked with paler, mid tibiae brown, proximal fifth whitish-brown, mid tarsi, whitish-brown, darker distally; hind legs black, trochanters, tibiae for a very small proximal part, and tarsi paler; tegulae brown. Wings hyaline, pterostigma brown, with a small distal and larger proximal hyaline patch. Surface

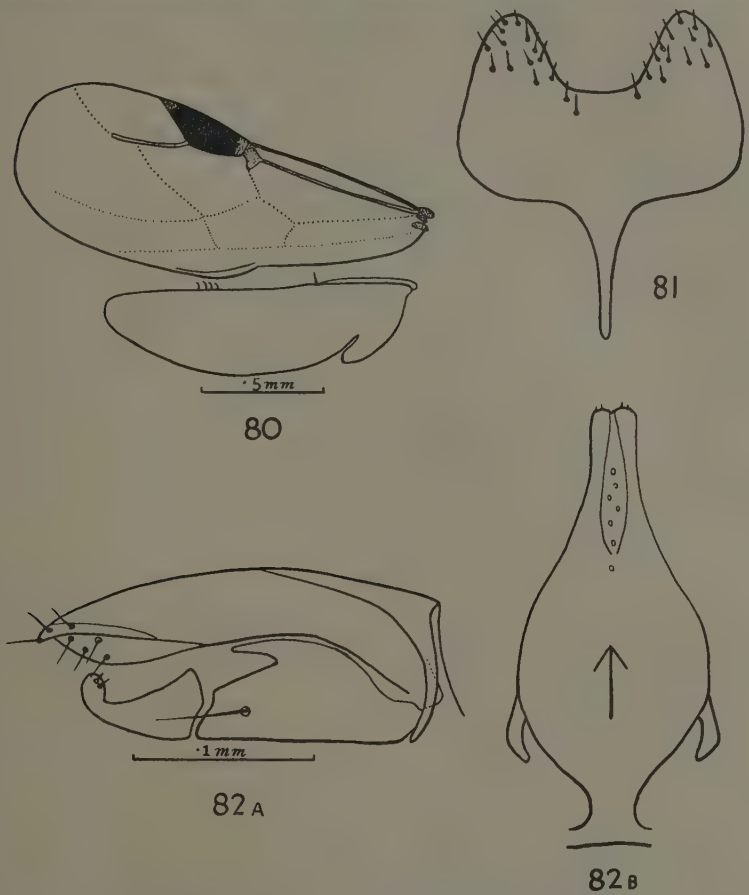


Fig. 80.—Left wings of *Aphelopus melaleucus* (Dalm.) ♀.
Fig. 81.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 82.—Same species, genitalia, (a) ventral view of right half, (b) dorsal view of parameres ♂.

of body (except abdomen) with inconspicuous but quite numerous outstanding pale hairs. Length about 1·75 mm.

Eyes hairy; head, in dorsal view (including eyes), a little more than twice as broad as long, vertex between eyes nearly one and a half times as broad as long, sides parallel in front, posteriorly with a feebly curved and raised margin, the anterior side of which is hardly crenate; antennae moderately long and tapering, all segments after 1 with outstand-

ing pubescence, not quite as long as diameter of segments, segment 1 globose, hardly longer than broad, not quite as long as 2, 2 also globose, one and a third times as long as broad, two-thirds as long as 3, 3–9 gradually increasing in length and decreasing a little in thickness, 3 about two and a half times, 9 about four times as long as broad, 3 clearly longer than 2, not quite two-thirds as long as 9, 10 five times as long as broad, as long or longer than 3 + 4; vertex dull, alutaceous, with a weak central keel from clypeus half-way to ocelli; ocellar triangle with posterior side at least half as long again as the other two sides, POL : OOL as 2 : 1, lateral margins of head behind eyes about as long as OOL, posterior ocelli removed from occiput by a fraction more than their diameter. Mesonotum dull, alutaceous, notaulices distinct, extending half-way across, where they end separated by one-third width of mesonotum; scutellum more shining, but still alutaceous, with no transverse furrow posteriorly; metanotum ("postscutellum") with rather large, convex, smooth central area; mesopleuron anteriorly dull, weakly rugose, posteriorly shining, lower half a little alutaceous; metapleuron smooth and shining; propodeum with dorsal and posterior faces moderately clearly separated, former two-thirds as long as latter, surface moderately strongly rugose but with a considerable amount of alutaceous surface visible between rugosities, posterior surface with a feebly defined area, twice as long as broad, shining, especially below. Abdomen smooth and shining, usually strongly compressed; ninth sternite (fig. 81) with a long proximal stalk, sides more or less curved and convergent, posteriorly strongly emarginate, depth about half the width of emargination, with 16–29 bristles (usually 21–26); genitalia (fig. 82) with parameres proximally broadly fused with gonoforcipes, distally strongly convergent, without any bristles or lateral processes; distivolsella long and narrow, not strongly curved nor sinuate, distally without teeth (sometimes a little irregular in outline), with two small bristles; basivolsella with a strong finger-shaped lateral process, which may be nearly as long as inner part but is usually distinctly shorter, inner part with one strong bristle; gonoforcipes not at all broadened distally, with about eight bristles, none of which is specially stout.

♀. Black; palpi, mandibles, clypeus, a U-shaped mark embracing bases of the antennae and with arms lying along inner margins of eyes, white; malar area (between eyes and base of mandibles) white, usually white area extending beyond the malar furrow on to tempora; antennae either black with segment 1 beneath and 8–10 often paler, or more or less white, in extreme forms entirely white; legs varying from brown with articulations and fore and mid tibiae paler, to entirely white; characteristically fore and mid legs are mainly pale and hind legs are mainly dark; tegulae dark testaceous to white. Wings hyaline, pterostigma brown with a hyaline proximal patch and often a small distal one. Surface of body (except abdomen) with numerous though not very conspicuous, outstanding, pale hairs. Length 1·5–2·0 mm.

Structurally resembles the male except in the following particulars: antennae shorter, more thickened, pubescence less dense and more recumbent, about half as long as diameter of segments, segment 1 thick,[23] cylindrical, about twice as long as broad, half as long again as 2, 2 thinner, pyriform, nearly twice as long as broad, two-thirds as long as 3, 3 very little thickened distally, two and a half times as long as broad, 4 sometimes a little longer than 1 or 3, 5–9 gradually decreasing in length and increasing in thickness, 5 hardly shorter than 3, 9 about one and a half times as long as broad, hardly as long as 2, 10 tapering, three times as long as broad, much shorter than 2 + 3; vertex alutaceous, sometimes with sparse, indistinct punctures anteriorly; sides of head behind the eyes shorter than OOL, ocelli removed from occiput by one and a half diameters. Mesopleuron with even posterior part alutaceous, though relatively shining. Abdomen terminating in a short curved sting, usually retracted.

[23] There is some variation in the thickness of the antennae, some specimens having the segments rather longer and thinner than indicated in the description.

Specimens examined: Notts, Widmerpool, ♂, 12.viii.1914 (M.); Lincs South, Boston, ♀, vi.1912 (M.); Suffolk East, Monks Soham, ♀ on *Laurus tinus*, 26.v.1910, ♀ on bullace, 29.v.1910, 2 ♂♂ on lime, 27.v.1910 and 24.v.1908 (M.); Cambs, Cambridge, ♀ on window, 29.v.1934 (*G. C. Varley*) (Ca.), Wood N.E. of Fleam Dyke, ♂♀, 27.v.1934 (*G. C. Varley*) (Ca.), Devil's Ditch, ♂, 27.v.1934 (*G. J. Kerrich*) (Ca.), Madingley, ♂, 20.vi.1934 (*G. C. Varley*) (Ca.); Hereford, Woolhope, ♀, 30.v.1936, Fownhope, ♀, 31.v.1936 (*E. B. Britton and J. F. Perkins*) (B.M.); Oxon, Henley, ♀, 18.viii.1936 (*J. F. Perkins*) (B.M.) and ♀ at honeydew on maple, 10.vi.1934 (*O.W.R.*); Bucks, Beaconsfield, 53 ♂♂, 31 ♀♀ on beech, 27.v.1934 (*J. F. Perkins*) (B.M.), Boveney, ♀ reared nest of Song Thrush, 2.vi.1934 (*E. B. Basden*), Farnham Common, ♂, vi.1934, ♂, vi.1935, 2 ♂♂, 2 ♀♀, 17.v.1934 (*J. F. Perkins*) (B.M.), Iver, 2 ♂♂, 24.v.1929, ♀, 16.viii.1930 (*O.W.R.*), Slough, bred *Typhlocyba crataegi* Edw., coll. 8.ix., larva emerged 16.ix.1938, ♀ em. 3–18.v.1939 (*O.W.R.*), Chalfont St. Peter, 3 ♂♂, 5.viii.1934 (*J. F. Perkins*) (B.M.), Slough, ♂ on window, 30.v.1934 (*O.W.R.*); Herts, Gade Valley, ♀, 20.v.1934, Brickett Wood, ♀, 9.vi.1936 (*R. B. Benson*) (B.M.); London, Blackheath, ♀, 4.v.1896 (M.), Chiswick, ♂, ix. (H.W.); Kent East, Faversham distr., ♀, 4.vi.1906 (*A. J. Chitty*) (M.); Kent West, Eynsford, ♂, 18.vi.1932 (*G. E. J. Nixon*); Surrey, Ashtead, 2 ♂♂, 31.v.1930, Boxhill, ♂, 13.vii.1929, 2 ♀♀, 8.vi.1930, Horsley, ♂, 8.vi.1930, ♂♀, 14.vi.1930, 4 ♀♀, 16 ♂♂, 30.v.1931, Claygate, ♀, 11.vi.1932 (*G. E. J. Nixon*); Berks, Windsor Forest, ♂, 5.viii.1931 (*G. E. J. Nixon*), Temple, ♀ reared nest Grey Squirrel, 8.v.1931 (*E. B. Basden*); Hants South, New Forest, ♀, 2 ♂♂, 19.v.1934 (*G. C. Varley* and *G. J. Kerrich*) (Ca.); Dorset, Studland, ♀, 21.v.1934 (*G. J. Kerrich*); Somerset South, Porlock distr., 2 ♀♀, vi.1934 (*J. F. Perkins*) (B.M.); Devon South, Dartmoor, Lustleigh, 5 ♀♀, vi.1934 (*J. F. Perkins*) (B.M.), Bovey Tracey, ♀, ix.1926 (*R.C.L.Perkins*) (B.M.); Scotland, Inverness East, Nethy Bridge, ♀, 26.vi., 3 ♀♀, 27.vi., 4 ♀♀, 2 ♂♂, 28.vi., ♀, 30.vi., ♀, 1.vii., ♂, 11.vii., ♂, 14.vii.1932 (*J. J. F. X. King*) (G.), Aviemore, ♂, 24–29.vi.1933 (*R. L. Coe*) (B.M.), Loch Morlich, ♀, 24.vi.1934 (*R. B. & J. E. Benson*) (B.M.), Nairn, Darnaway Forest, 2 ♂♂, 5.vi.1934 (*R. B. & J. E. Benson*) (B.M.); Perth North, Rannoch, ♂, 20.vi., ♀♀, 1 and 8.vii.1917 (*J. J. F. X. King*) (G.); Argyll, Kilmun, ♀, 22.vi.1925 (*J. J. F. X. King*) (G.); Stirling, Clober, ♀, vi. (*P. Cameron*) (B.M.); Renfrew, ♀, Bishopton (*P. Cameron*) (B.M.); Lanark, ♂, Kenmuir, 3 ♀♀, Cadder, 2 ♀♀, Clydesdale (*P. Cameron*) (B.M.); Dumfries, ♂♀ (*P. Cameron*) (B.M.), Gretna, ♀, 2.vi.1938, ♂, 28.v.1936 (*J. Murray*), Corrie, ♀, 4.vi.1932 (*J. Murray*); Ireland, Dublin, Saggart, 2 ♂♂, 5.vi.1935, Harold's Cross, ♂, 18.v.1936 (*A.W.S.*); Wicklow, Kings River, ♂, 6.vi.1937, Dowry, ♂, 13.vi.1937, Clara, ♂, 5.vi.1932, Powerscourt, ♀, 8.vi.1934 and ♂, 29.v.1927 (*A.W.S.*); Carlow, Bahanna Wood, ♂, 16.v.1935, Carriglead, 61 ♂♂, 22 ♀♀, 15.v.1935 (*A.W.S.*); Kildare, S. of Gilltown, ♂, 7.v.1933 (*A.W.S.*); Kilkenny, Brandondale, ♂♀, 8.vi.1935 (*A.W.S.*); "Ireland" ♀ (*Haliday*) (D.); "Britain," ♂, 2 ♀♀ (*Walker*) (B.M.), 8 ♀♀, 5 ♂♂ (*Haliday*) (D.); no data, ♂ (Ca.), ♀, 3 ♂♂ (Smith coll.) (B.M.), 2 ♀♀ (Desvignes coll.) (B.M.), ♂ (Stephens coll.) (B.M.), ♀ (Walker coll.) (B.M.), 7 ♂♂, 9 ♀♀ (H.D.), ♂, 3 ♀♀ (H.W.).

I have also seen the following: "S. France," ♂♀ (Walker coll.) (B.M.); France, Lille ♂♀ (*de Gaulle*) (P.), ♂ "horloge," 10.v.1874 (*L. Fairmaire*) (P.), Fontainebleau, 2 ♀♀, 12.v.1935 (*Seyrig*) (P.); Austria, ♀, 14.v. (*Giraud*) (P.). Mr. J. F. Perkins kindly examined the type of *Gonotopus melaleucus* Dalman, 1818, at Stockholm and it is evidently a female of the present species. It appears to be the only European species with the head extensively white-marked (except *A. albipes* (Ratz.) which requires re-description).

The male varies somewhat in colour and also in the number of bristles on the ninth sternite. The following are the frequencies of the various bristle-numbers: 16,2; 17,0; 18,0; 19,2; 20,3; 21,10; 22,11; 23,9; 24,8; 25,8: 26,10; 27,1; 28,2; 29,2. This variation seems to be unrelated to locality or to time of year.

The females vary very strikingly in colour and the extreme forms with entirely white antennae are at first sight very distinct. The dark and light forms, however, are connected by a complete series of intermediates. The size of the areas of white on the malar area, vertex, antennae and legs are loosely correlated. The female variation may be classified as follows: malar area below the furrow dark, antennae mainly dark, 18; malar area with a white patch below the furrow, antennae mainly dark, 54; malar area with a white patch (usually larger) below the furrow, antennae mainly white (sometimes a little brown on intermediate segments), 37. The females with pale antennae were all captured in May, but not enough specimens have been captured later in the year to know whether the variation is seasonal. Of the eighteen specimens with no white mark on the lower part of the malar area, 12 are Scottish, 2 Dartmoor, 2 Exmoor, 2 no locality, so possibly these dark forms are northern or found in hilly districts. The amount of white on the male head also varies. Some of the Scottish specimens have very little, and one from Rannoch has the head and clypeus entirely black. Usually, however, the small white spots near the antennal sockets are quite traceable.

From the detailed list of captures, the following seasonal history of the species can be abstracted:—

Month of capture:	May	June	July	Aug.	Sept.
No. of ♂♂ caught	148	19	3	5	1
No. of ♀♀ caught	71	32	3	2	1

It is fairly clear, therefore, that there are two generations a year, the second emergence being perhaps only a partial one. Giard (1889, 1889a), in Paris, found *A. melaleucus* (Dalm.) (presumably the determination was correct) attacking *Typhlocyba hippocastani* Edw. and *T. douglasi* Edw. on walnuts. He also refers to parasitised specimens of *T. hippocastani* Edw. and *T. ulmi* (L.) found at Meudon and Wimereux; but in these localities the sac was more often black than yellow, so that a different species of *Aphelopus* may well have been involved.

Aphelopus serratus sp. n.

♂. Black; palps, mandibles (except reddish teeth), clypeus, nearly all fore coxae, distal half of mid coxae, all trochanters, distal quarter of fore femora, fore tibiae, white; rest of legs brown, fore tarsi and mid tibiae and tarsi paler; tegulae brown. Wings hyaline, pterostigma brown, with proximal and distal pale patches. Surface of body (except abdomen) with numerous outstanding pale hairs. Length 1·75 mm.

Structurally resembles *A. melaleucus* (Dalm.) except in the following particulars: eyes less hairy; antennae rather shorter, not tapering; segments 1 and 2 less globose, of same length, one and a half times as long as broad, 3–9 of almost identical length, about three times as long as broad, 10 a little more than four times as long as broad, not quite as long as 3 + 4; vertex with distinct traces of shallow punctures on top of shagreening, especially anteriorly; posterior ocelli separated from occiput by one and a half diameters. Mesonotum with notaulices longer, approaching to within half the width of scutellum from posterior margin; propodeum with rugosities of dorsal surface rather more irregular and widely spaced, surface rather more shining, area of posterior surface less defined. Ninth sternite

(fig. 83) with a long proximal stalk, sides parallel (forming angles with the divergent margins of the stalk), posteriorly very strongly emarginate, depth fully three-quarters width of emargination, lobes so formed almost pointed, with 28–64 bristles (nearly always more than 30, in more than half the specimens 40 or more); genitalia (fig. 84) with parameres proximally broadly fused with gonoforcipes, distally strongly convergent, without any bristles and only with very feeble lateral processes; distivolsella in the form of a long straight rod

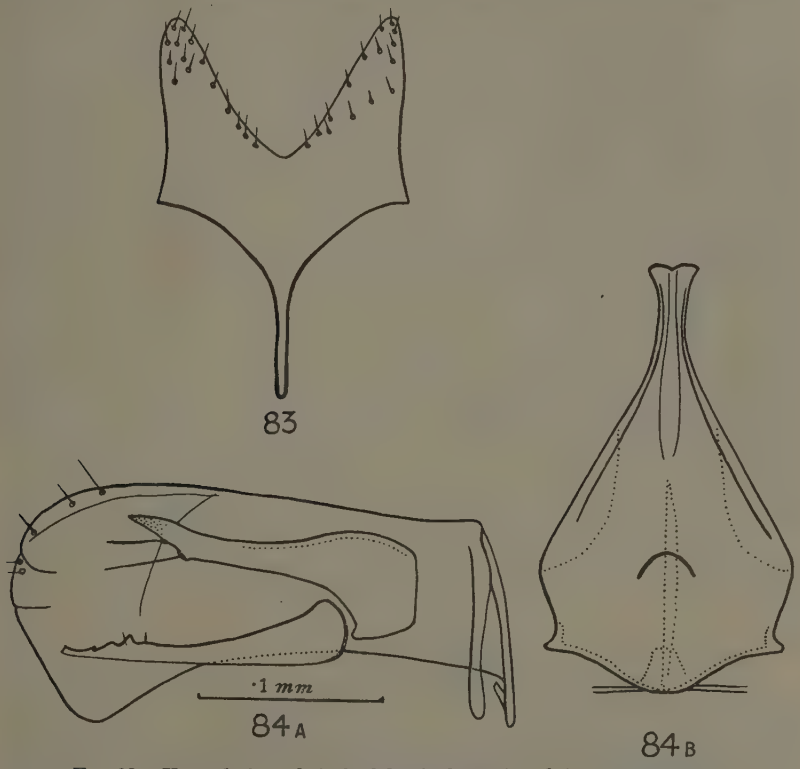


Fig. 83.—Ventral view of ninth abdominal sternite of *A. serratus* sp. n. ♂.
Fig. 84.—Same species, genitalia, (a) ventral view of right half, (b) dorsal view of parameres ♂.

(more than half as long as gonoforceps) distally bearing 4 or 5 small teeth and 2 small bristles; basivolsella also relatively long and narrow, distally pointed and bearing 2 (very rarely 1 or 3) bristles, with no inner process; gonoforcipes strongly broadened distally, with 5–8 fine bristles.

♀.[24] Black; palpi, mandibles and clypeus white; antennae entirely dark; legs with fore and mid pair mainly pale, with mid femora always, fore femora sometimes, considerably brown marked, hind legs brown or black, with the trochanters pale; tegulae dark brown. Wings hyaline, pterostigma brown, hyaline spots not distinct. Surface of body (except

[24] The present series may include a few specimens of *A. camus* sp. n., but if so, I cannot distinguish them.

abdomen) with numerous though not very conspicuous, outstanding, pale hairs. Length 1·5–2·5 mm.

Structurally very close to the other species: antennae about as in *A. melaleucus* (Dalman), but segments 7–9 rather longer, fully twice as long as broad, 7 not so distinctly shorter than 6. Punctures of vertex usually more distinct.

Type ♂ London, Norwood, vii.1929 (*G. E. J. Nixon*); allotype ♀ London, Norwood, v.–vi.1929 (*G. E. J. Nixon*). Paratypes: Suffolk West, Tuddenham Fen, 1 ♀, 19.vi.1915, 2 ♀♀, 5.vi.1916 (M.); Gloster West, Staunton, 7.vi.1936 (*E. B. Britton* and *J. F. Perkins*) (B.M.); Bucks, Slough, on window, ♂, 3.vii.1935 (*O.W.R.*); Oxon, Henley at honeydew on maple, ♀, 10.vi.1934 (*O.W.R.*); East Kent, Faversham distr., ♂, 4.vi.1906 (*A. J. Chitty*) (M.); Surrey, Horsley, ♀, 14.vi.1930, Boxhill, ♀, 8.vi.1930 (*G. E. J. Nixon*); Dorset, Studland Heath, ♀, 21.v.1934 (*G. J. Kerrich*) (Ca.); Scotland, Inverness East, Nethy Bridge, ♂, 1.vii.1922 (*J. J. F. X. King*) (G.); Lanark, Clydesdale ♂ (Cameron coll.) (B.M.); Dumfries, Newton Moss, ♀, 8.vi.1936 (*Jas. Murray*); Ireland, Down, Donaghadee, ♀, 1.vi.1938 (*A.W.S.*); Dublin, Phoenix Park, ♂, 8.v.1933 (*A.W.S.*); "British" 3 ♂♂, 3 ♀♀ (Haliday coll.) (D.); no data, 2 ♂♂ (H.W.), 4 ♂♂ (H.D.).

The actual numbers of bristles observed on the male ninth sternite were as follows: 28, 30, 31, 36, 36, 36, 40, 50, 53, 53, 59, 64; the number of bristles on the terminal part of the gonoforcipes were (specimens arranged in the same order): 5, 6, 7, 8, 7, 6, 7, 6, 7, 6, 5, 5, the number of bristles on the basivolsella was 2, except in the type which had 1, and the specimen which had 40 bristles on the ninth sternite, which had 3; the distivolsella ended in 4 teeth except that two specimens had 5; it always bore two bristles.

The females are rather constant in colour, the only variation being an increase in the dark pigment of the fore and mid femora in two specimens.

The type and allotype will be deposited in the British Museum. The specimen recorded from Donaghadee is one of a large number found by Mr. Stelfox sweeping under some trees in the corner of a field after heavy rain.

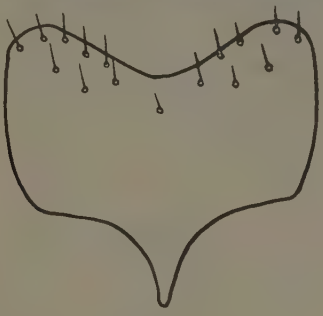
Aphelopus heidelbergensis sp. n.

♂. Black; palpi, mandibles (except reddish teeth) and clypeus pure white; legs dark brown, fore tibiae and tarsi whitish, fore femora and mid tibiae and tarsi, pale brown; tegulae brown. Wings hyaline, pterostigma brown with distal and proximal pale patches. Surface of body (except abdomen) with numerous though inconspicuous, pale, outstanding hairs. Length about 1·75 mm.

Structurally resembles *A. melaleucus* (Dalm.) except in the following particulars: antennae a little shorter and proximally thinner; segment 1 subcylindrical, one and a half times as long as broad, as long as 2, 2 cylindrical, a little more than twice as long as broad, two-thirds as long as 3, 3–6 (7–10 missing) gradually increasing in length, 3 a little over three times, 6 four times as long as broad; vertex with distinct traces of numerous shallow punctures on top of the shagreening; central keel almost obsolete; posterior ocelli removed from occiput by nearly twice their diameter. Posterior part of mesopleuron duller, more alutaceous; dorsal surface of propodeum more shining. Ninth sternite (fig. 85) with a short proximal stalk, sides parallel, posteriorly weakly emarginate, depth about one-third the width of the emargination; with 16 bristles; genitalia with parameres (fig. 86) proximally narrowly fused with gonoforcipes, distally rather strongly convergent, truncate with two strong lateral processes and four strong bristles; volsella and gonoforceps as in *A. melaleucus* (Dalm.).

♀. Black; palpi, mandibles and clypeus white; antennae with segment 1 yellow beneath; legs pale yellow, mid and hind femora dark brown, hind tibiae light brown; tegulae testaceous. Wings hyaline, pterostigma brown with hyaline proximal and distal spots. Surface of body (except abdomen) with numerous though not very conspicuous, outstanding pale hairs. Length 1·75 mm.

Structurally very close to the other species: antennae long and thin, segments 3–6 all longer than 1, fully three times as long as broad, 7 distinctly shorter than 6, two and a half



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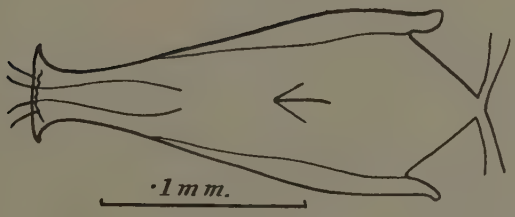

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Fig. 85.—Ventral view of ninth abdominal sternite of *A. heidelbergensis* sp. n. ♂.
Fig. 86.—Same species, genitalia, dorsal view of parameres ♂.

times as long as broad, 8–9 twice as long as broad (10 missing). Vertex with weak punctures moderately distinct in front.

Type ♂ Germany: Heidelberg, 6–12.vii.1931 (*G. E. J. Nixon*). Allotype ♀ with the same data. Both specimens will be deposited in the British Museum collection.

I thought it advisable to describe this species, although non-British, so that its relation to the other species could be clearly shown. A ♂ Czechoslovakia: Carlsbad (*Giraud*) (P.) may belong to this species, but I did not examine the genitalia.

Aphelopus camus sp. n.

♂. Black; palpi and mandibles (except reddish tips) white; clypeus more or less dirty white, except for the posterior third or quarter; legs brown, fore trochanters, distal quarter of fore femora, fore tibiae and tarsi whitish; mid tibiae and tarsi, distal part of hind tibiae

and all hind tarsi paler; tegulae testaceous. Wings hyaline, pterostigma brown with a proximal and distal pale patch. Surface of body (except abdomen) with numerous pale outstanding hairs. Length 1·75 mm.

Structurally similar to *A. melaleucus* (Dalm.) except in the following particulars: antennae rather longer and thinner, not tapering; segment 1 subcylindrical, one and a half times as long as broad, clearly longer than 2, two-thirds as long as 3, 2 oval, little longer than broad, segments 5 and 6 the longest, both 8 and 9 or 3 and 4 a little shorter; 3 about two and a half times, 6 about five times, 9 about three times as long as broad, 3 three-

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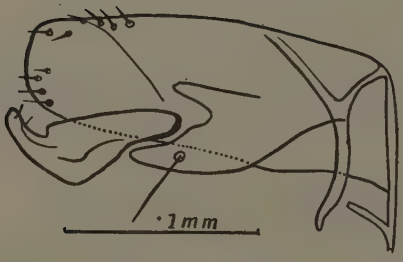
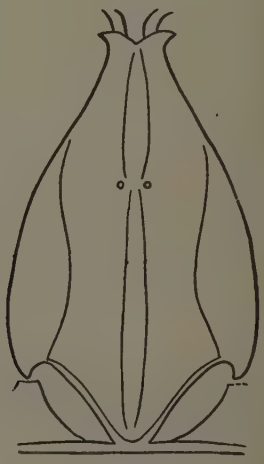


88 A



88 B

Fig. 87.—Ventral view of ninth abdominal sternite of *A. camus* sp. n. ♂.
Fig. 88.—Same species, genitalia, (a) ventral view of right half, (b) dorsal view of parameres ♂.

quarters as long as 9, 10 five times as long as broad, a little shorter than 3 + 4; vertex with distinct traces of shallow punctures on top of the shagreening, central keel nearly obsolete; posterior ocelli removed from occiput by fully twice their diameter. Mesopleuron posteriorly rather duller; propodeum a little more shining. Ninth sternite (fig. 87) with a short proximal stalk, sides more or less strongly rounded and convergent, posteriorly weakly emarginate, depth a little more than one-third the width of the emargination, with 16–18 (usually 18) bristles; genitalia (fig. 88) with parameres broadly fused to the gonoforcipes, distally rather strongly convergent, with two strong lateral processes and four strong bristles; distivolsella markedly sinuous, without distal teeth, with two small bristles;

basivolsella with a strong finger-like process from the lateral margin and one strong bristle; gonoforcipes little broadened, with 8–11 fine bristles.

♀ not known.

Closely allied to *A. heidelbergensis* sp. n., but the ninth sternite (though somewhat variable in outline) has the sides more rounded and the distivolsella has a different shape; the antennae, also, are rather longer.

Type ♂ Cambridge, Storeys Way, windows of laboratory, 4.vii.1934 (*G. C. Varley*). Paratypes: 3 ♂♂, same locality as type, 5.vii.1934, 11.vii.1934 and 1.viii.1935 (*G. C. Varley*) (Ca.); no data, ♂ (Stephens coll.) (B.M.). A male labelled "Dnt" (probably Kent West, Darenth Wood) (H.W.) probably also belongs to this species, but the genitalia were lost. The type has been deposited in the British Museum.

The number of bristles observed on the ninth sternite were 18, except in one specimen which had 16. The basivolsella always had 1 and the distivolsella 2 bristles.

Aphelopus holomelas sp. n.

♂. Black; palps, mandibles (except reddish tips) white; legs brownish-black, fore tibiae and tarsi whitish, fore coxae distally, fore trochanters, mid coxae distally, mid tibiae and tarsi, paler; tegulae brown. Wings hyaline, pterostigma brown, proximally and distally paler. Surface of body (except abdomen) with numerous but inconspicuous, pale, outstanding hairs. Length about 1·75 mm.

Structurally resembles *A. melaleucus* (Dalm.) except in the following particulars: antennae a little shorter but with segments of nearly the same proportions, 3 twice as long as broad, as long as 2, about three-fifths as long as 9 which is hardly more than three times as long as broad; vertex with distinct traces of shallow punctures on top of the shagreening, central keel shorter. Propodeum more coarsely rugose, spaces between the rugosities shining, posterior area smoother and more shining. Ninth sternite (fig. 89) with a short proximal stalk, sides usually straight and parallel (rarely curved and convergent), distal margin truncate, with 10–19 bristles (usually 12–17); genitalia (fig. 90) with parameres rather broad, proximally broadly fused with gonoforcipes, distally tridentate, the two lateral processes truncate, the central process with four strong bristles and sometimes two minute ones as well; distivolsella moderately long, curved, with four strong preapical teeth and two or three small bristles; basivolsella with a small angulation on its outer margin (no long finger-shaped process), inner part nearly always with two strong bristles (rarely with only one); gonoforceps not at all broadened distally, with 8–11 bristles of which two are extra strong and directed anteriorly.

♀. Black; palpi and mandibles white, antennae usually black, sometimes segments 1–2 more or less pale, or even 1 entirely yellow, only rarely, however, does the colour of segments 1–2 contrast sharply with that of segments 3–10; legs characteristically with fore and mid legs pale and hind legs mainly dark, rarely all legs mainly dark, or hind tibiae entirely pale; tegulae testaceous. Wings hyaline, pterostigma brown with a distinct proximal and an indistinct distal hyaline patch. Surface of body (except abdomen) with numerous though not very conspicuous, outstanding hairs. Length 1·5–2·0 mm.

Structurally close to *A. melaleucus* (Dalm.) but: antennae essentially similar, with segments 3–5 subequal, about as long as 1, 6 a little shorter, 7 clearly shorter than 6. Punctures of vertex often rather more distinct.

Type ♂ Devon South, Dartmoor, Lustleigh, vi.1934 (*J. F. Perkins*) (B.M.). Allotype ♀ Devon South, Lustleigh, 14.viii.1929 (*G. E. J. Nixon*) (now in coll. B.M.). Paratypes: Suffolk East, Monks Soham, ♂, 13.vii.1921 (M.); Gloster

West, Newland, ♀, 6.vi.1936 (*E. B. Britton* and *J. F. Perkins*) (B.M.) Oxon, Henley at honeydew on maple, 16 ♂♂, 10.vi.1934 (*O.W.R.*); Bucks, Iver, ♂, 3.viii.1930 (*O.W.R.*), Slough on apple, ♂, 1.vi.1934, ♀, 17.vii.1936 (*O.W.R.*), Slough, ♂ bred *Typhlocyba opaca* Edw. on apple, 16.ix.1935, em. v.1936

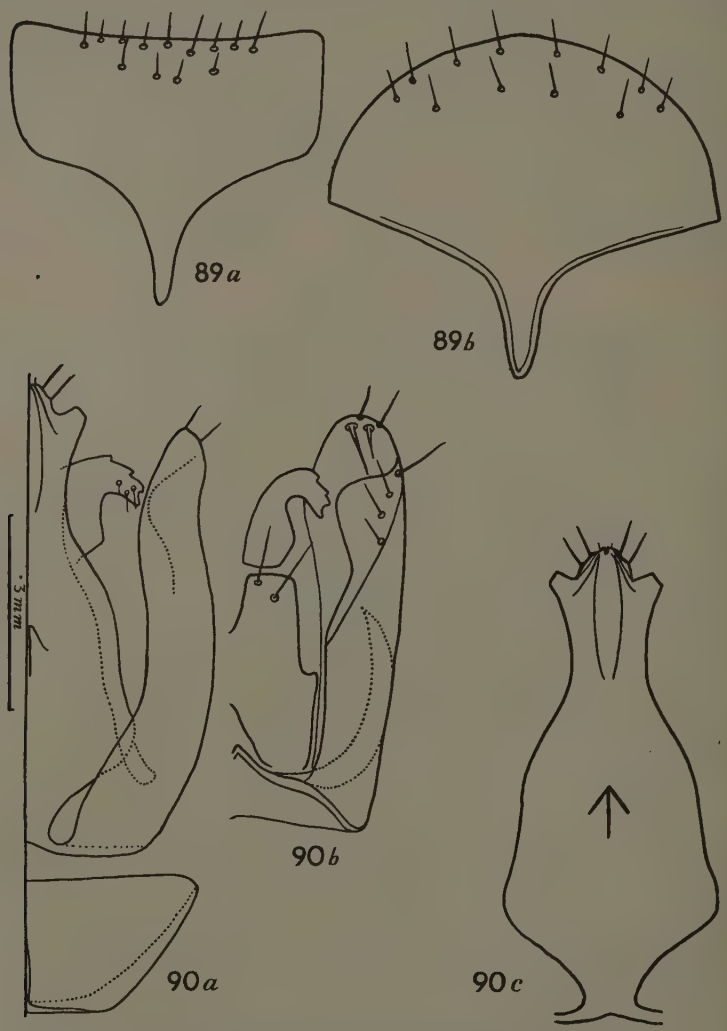


Fig. 89.—Ventral view of ninth abdominal sternite of *A. holomelas* sp. n. ♂, (a) normal form, (b) variety.
Fig. 90.—Same species, genitalia, (a) dorsal, (b) ventral view, (c) dorsal view of parameres ♂.

(*O.W.R.*); London, Norwood, 2 ♂♂, v.–vi.1929, 8 ♀♀, vii.1929 (*G. E. J. Nixon*); Kent East, Charing, on oak, ♀, on hazel, ♂, 9.viii.1935 (*O.W.R.*); Surrey, Combe Wood, 17.vi.1827 (H.W.), Croydon, ♂, vi.1931 (*A. Stringer*), Horsley, ♂, 1.vi.1929 (*G. Vredenburg*), 3 ♀♀, Ashtead, 3.vii.1932, 30.vii.1932, 25.viii.1929 (*G. E. J. Nixon*), Oxshott, ♀, 9.viii.1930 (*G. E. J. Nixon*); Dorset, Poole, ♂, v.1934 (*D. S. Wilkinson*) (B.M.); Devon North, ♂, Barnstaple (F.); Devon South, Torquay, 4 ♂♂, 8 ♀♀, viii.1929 (*G. E. J. Nixon*), Dartmoor, Lustleigh, ♂, vi.1934 (*J. F. Perkins*) (B.M.), 2 ♀♀, 14.viii.1929 (*G. E. J. Nixon*); Scotland, Sutherland South, Bonar Bridge, ♀ (*P. Cameron*) (B.M.); Inverness East, Aviemore, ♂, 30.vi.1934 (*R. B. and J. E. Benson*) (B.M.); Argyll, Claddich, ♂ (*P. Cameron*) (B.M.); Dumbarton, Fanslane, ♀, 14.vii.1938 (*A.W.S.*); Dumfries, ♂ (*P. Cameron*) (B.M.); Ireland, Sligo, Trewalua, ♂, 24–29.vii.1933 (*G. E. J. Nixon*); no data, ♂♀ (Stephens coll.) (B.M.), ♂♀ (H.W.), 3 ♂♂, 1 ♀ (H.D.), ♂ (M.), ♀ (Haliday coll.) (D.).

This is the only common species of *Aphelopus* besides *A. melaleucus* (Dalm.). It is rarer than that species and occurs later in the year. I have also examined: France, Maisons-Lafitte, 2 ♀♀, v. (*de Gaulle*) (P.) and a probable ♂ (genitalia not examined) Maisons-Lafitte, 21.vi. (*de Gaulle*) (P.).

The frequency of the various bristle numbers on the male ninth sternite were as follows: 10 bristles, 1 specimen; 11,0; 12,5; 13,4; 14,6; 15,2; 16,4; 17,4; 18,1; 19,2.

The female varies a good deal in colour, the legs varying from entirely pale with the hind femora a little darker, to black, with fore and mid coxae, front tibiae and part of front femora pale. The antennae are black, with segments 1–2 often paler. The following distribution of antennal pattern was observed: Antennae black, 7; black with 1–2 brown, 14; black with 1 yellow and 2 brown, 3; black with 1–2 yellowish, 3; black with 1–2 sharply yellow, 3.

The months of capture of the specimens were as follows:—

	Month:	May	June	July	Aug.
♂	. . .	3	23	2	6
♀	. . .	0	2	12	13

These data are insufficient to prove whether there are one or two generations a year, but there is probably at least a partial second generation in the autumn. The specimen bred at Slough shows that the species hibernates as a resting larva in its cocoon.

Aphelopus nigriceps Kieffer.

A. melaleucus var. *nigriceps* Kieffer, 1905.

♂. Black; palps, mandibles (except reddish teeth), distal quarter of fore femora, fore tibiae, fore tarsi (except last two segments), first two segments of mid tarsi and hind basitarsus white; fore coxae distally, all trochanters, and fore and mid femora paler brown; tegulae brown. Wings hyaline, pterostigma brown with pale proximal and distal patches. Surface of body (except abdomen) with numerous, pale, outstanding hairs. Length 1·75 mm.

Structurally similar to *A. melaleucus* (Dalm.) except in the following particulars: eyes less hairy; antennae less tapering, segments of same proportions but rather shorter, 3 little more than twice as long as broad and 9 than three and a half times; 10 as long as 3 + 4; vertex with distinct traces of shallow punctures on top of the shagreening, central keel shorter; posterior ocelli separated from occiput by fully one and a half diameters. Mesonotum with notaulices distinctly longer, extending two-thirds of the way across; mesopleuron posteriorly more alutaceous; propodeum more shining with more widely

spaced and irregular rugosities. Ninth sternite (fig. 91) with a short proximal stalk, sides curved and convergent, posteriorly very shallowly emarginate, depth hardly more than a quarter the width of emargination, with 27–38 bristles (usually 28–32); genitalia (fig. 92) with parameres proximally narrowly fused with gonoforcipes, distally strongly convergent then expanded into a small, trumpet-like structure bearing four small bristles; distivolsella large, markedly sinuate, distally without teeth with two small bristles; basivolsella very broad, with a lateral process extending further posteriorly than the central one, bearing two strong bristles; gonoforceps strongly broadened, bearing 8–11 fine bristles.

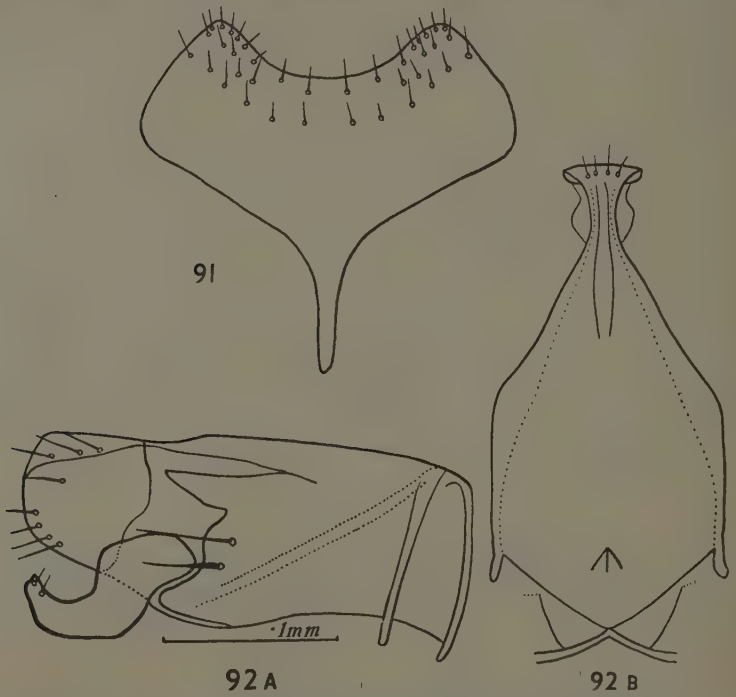


Fig. 91.—Ventral view of ninth abdominal sternite of *A. nigriceps* Kieff. ♂.
Fig. 92.—Same species, genitalia, (a) ventral view of right half, (b) dorsal view of parameres ♂.

♀. Black; palpi and mandibles white; antennae with segments 1–2 bright yellow, sharply contrasting with segments 3–10 which are black; all legs usually mainly yellow, but hind femora and coxae are often dark marked, and the hind tibiae sometimes brownish; tegulae testaceous. Wings hyaline, pterostigma brown, proximal and distal hyaline spots distinct. Surface of body (except abdomen) with numerous though not very conspicuous, outstanding, pale hairs. Length 1·75–2·75 mm.

Structurally very close to the other species: antennae with segments about as in *A. melaleucus* (Dalm.) but usually a little longer, also longer than in *A. holomelas* sp. n., antennal segment 7 clearly shorter than 6; clypeus usually flatter and more truncate than in the other species; punctures of vertex usually rather distinct.

Specimens examined : Type of *A. nigriceps* Kieff., Dumfries, ♀ (*P. Cameron*) (B.M.) (*see* Richards, 1936a : 464); Suffolk East, Monks Soham on window, ♀, 1.ix.1927, ♀ on hawthorn, 18.viii.1927 (M.); Kent East, Faversham district, ♀, 4.vi.1906 (*A. J. Chitty*) (M.); Surrey, Horsley, ♀, 30.v.1931 (*G. E. J. Nixon*); Isle of Wight, Parkhurst, ♀, 21.vi.1907 (M.); Scotland, Sutherland South, Bonar Bridge, ♂ (*P. Cameron*) (B.M.); Argyll, Claddich, ♀ (*P. Cameron*) (B.M.); Dumfries, ♂♀ (*P. Cameron*) (B.M.); Ireland, Sligo, Trewalua, ♀, 24–29.vii.1933 (*G. E. J. Nixon*); Wicklow, Dowry, 2 ♂♂, 13.vi.1937 (*A.W.S.*); West Meath, Hill of Down, ♀, 20.vi.1937 (*A.W.S.*); Carlow, Bahanna Wood, 6 ♂♂, 1 ♀, 9.vi.1935 (*A.W.S.*); Kilkenny, Brandondale, ♀, 8.vi.1935 (*A.W.S.*); "British," ♀ (*Haliday*) (D.).

The records based on females must be received with caution as there is no absolutely certain criterion for distinguishing this sex from *A. holomelas* sp. n. A ♂, "herbes," 10.vi.1880 (*L. Fairmaire*) (P.) may belong to this species but I did not examine the genitalia.

The number of bristles observed on the ninth sternite of the males was as follows : 27, 28, 29, 32, 38.

9. The British Emboleminae.

This subfamily is represented in Great Britain by a single species, very rare in the female sex and usually so in the male also. The sexes are so different that they have hitherto usually been regarded as belonging to different genera. In 1936 (Richards, 1936 : 170) I gave reasons for regarding *Myrmecomorphus rufescens* Westwood as the female of *Embolemus ruddii* Westwood (male), the latter name having priority. There has never been a clear description of a wingless male corresponding to *Myrmecomorphus* though Kieffer makes vague reference to one which he does not describe. Recently Heim de Balsac (1935) has also referred to males, but Mons. L. Berland kindly informs me that there has been some confusion and that all the French specimens of *M. rufescens* he has examined are females also.

Besides the British species, Kieffer records two other species (female specimens) from south Europe and one from Chile. Brues (1922) described a species (female) from the United States and there is an undescribed female from China in the collection of the British Museum. Brues (1933) has described a male from the Baltic amber and in the British Museum collection there are males of this or of closely allied genera from Java and S. Africa. The genus *Ampulicimorpha* Ashmead has one North American species and one from the Baltic amber. Certain other genera, described as Bethylids, may really belong here (*see* Brues, 1922a), but this question requires further study.

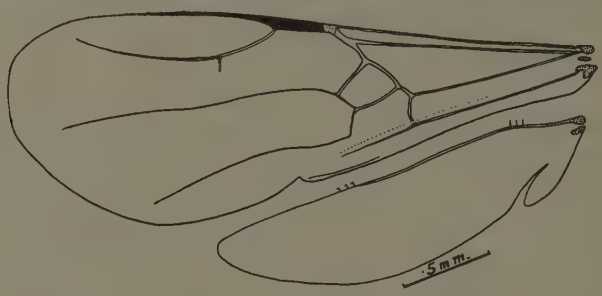
The only record of the early stages of this family is found in a brief note by Perkins (1905 : 27, footnote), who refers to "an undescribed insect which I refer to this (Embolemінae) group, though its structures will necessitate changes in the characters assigned to the Embolemінae. The larva is an external parasite of small crickets of the genus *Trigonidium* or allied forms, and like the Dryinidae leaves the several larval skins behind, as a ruptured sac, after the penultimate larval ecdysis."

This is apparently the insect later described as *Harpagocryptus* Perkins, 1908 (*see* Brues 1922a). Mr. J. A. Reid has recently (1939, *Proc. R. ent. Soc. Lond.* (B) **8** : 95–102) studied some apparently allied forms (*Olixon* Cam., etc.) and concluded that they are Pompilidae. It is just possible that the Embolemінae are allied to that family, but it is still very uncertain whether *Harpagocryptus* is allied either to the Embolemids or to *Olixon*.

Embolemus Westwood, 1833 (vi.).

Both sexes with antennae inserted on a process of front high above clypeus from the dorsal margin of which impressed lines extend up to the process. Proximal antennal segments unusually elongate. Occipital margin complete. Outer spur of hind tibiae subovate.

Male fore-wings (fig. 93) with four closed cells and three others partially closed, pterostigma distally attenuate. Hind-wings with a well-marked anal lobe, three straight proximal and three curved distal hamuli. Mouth-parts essentially as in the female (see below) but maxillary palpi with six (first very short), labial with three segments, sclerites of maxilla with lateral flanges feebler. Mesonotum with both notaulices and parapsidal furrows present. Ninth sternite with a proximal stalk. Genitalia (fig. 94) with gonoforceps emitting a finger-shaped medial process, basivolsella large but ill-defined laterally, distivolsella distinct, simple, separate with no apophysis distinct from proximal portion.



93

Fig. 93.—Left wings of *Embolemus ruddii* Westw. ♂.

Female with wings scale-like. Mouth-parts with the maxillary stipes large, with big, lateral, flange-like expansions, distally bearing a small lacinia and larger galea; palpi with three segments all quite long; labium with mentum well sclerotised, sub-triangular, glossa in the form of a broad rounded lobe bearing rows of strong bristles, labial brushes ("brosses labiales" of Bugnion) developed but no paraglossae, palpi with two large segments. Mesonotum reduced, without notaulices or parapsidal furrows.

Genotype (genus monobasic) *E. ruddii* Westwood, 1833. Synonyms. *Myrmecomorphus* Westwood, 1883a (xi.); genotype (genus monobasic) = *M. rufescens* Westwood, 1833a ♀. *Pedinomma* Förster, 1856 with the same type.

Embolemus ruddii Westwood, 1833 (vi.).

M. rufescens Westwood, 1833a (xi.).

♀. Entirely reddish-testaceous, except the black eyes, covered with a very short pale pubescence. Length 4·0 mm. Head pyriform, the "stalk" of the pear being a short projection to which the antennae are attached, the mouth being almost vertically below the dorsal occipital margin; in dorsal view about one and two-third times as long as greatest width (just behind eyes), sides almost parallel up to eyes, converging in front of them, posterior angles obtuse but distinct and not much rounded; distance from eye to posterior margin of antennal socket one and a half times longest diameter of eye, distance from eye to occipital margin nearly three times greatest diameter of eye; surface of head moderately

shining, with excessively minute, close punctures; clypeus transverse, rather strongly convex (not keeled), with a feebly rounded ventral margin, above clypeus two converging impressed lines extend up to antennae, defining a very narrow, triangular area; distance from eye to base of mandibles nearly as great as that from eye to occiput, mandibles with a strong ventral and three weaker dorsal teeth; antennae about as long as whole body, segment 1 straight, cylindrical, longer than greatest length of head, as long as 3 + 4, about eight times as long as broad, 2 about two and a half times as long as broad, 3–9 all of about same length and thickness, about five times as long as broad, 10 a little longer; eyes oval, one diameter about half as long again as the other, with very fine short hairs; ocelli minute

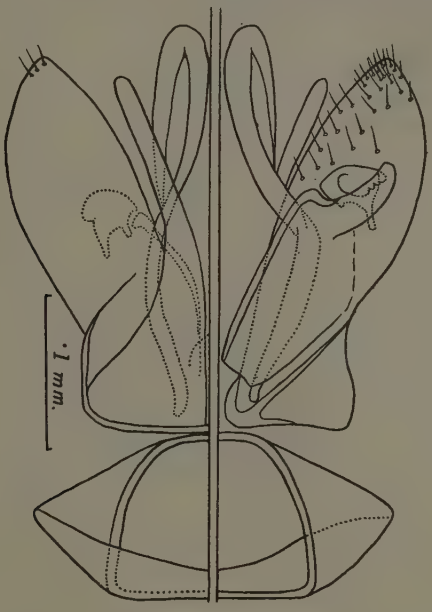


Fig. 94.—Same species, genitalia, (a) dorsal, (b) ventral view ♂.

(probably non-functional), in an equilateral triangle, median ocellus on a level with hind margin of eyes, posterior ocelli separated from occiput by 3–4 times the distance between them; occiput with a fine and complete raised margin. Lengths of pronotum, mesonotum, scutellum and dorsal surface of propodeum as 10 : 3 : 2 : 8; pronotum a little longer than broad, anterior angles rounded, anteriorly weakly depressed into a collar, posterior margin obtusangularly emarginate, in lateral aspect posterior margin of collar produced as an impressed line down to posterior edge of fore coxae, whole surface rather dull, very finely coriaceous; mesonotum one and a half times as broad as long, more coarsely coriaceous, with lateral margins raised, without furrows; scutellum with strongly raised, posteriorly convergent, lateral margins, separated from mesonotum by a transverse depression; mesopleuron consisting of a single plate, coriaceous with traces of oblique striae; depression in mesosternum for reception of fore coxae defined in front by strong keels; metapleuron partially separated from mesopleuron by a keel, coriaceous and transversely

striate; fore-wings scale-like, nearly as long as mesonotum, tegulae relatively large, more than half as long as wings, hind-wings probably absent; legs long, fore femora and coxae considerably thickened, tibiae not quite so long as their femora, tarsi very long, cylindrical, half as long again as their tibiae, claws simple; fore tibia with one spur bearing a broad, hyaline, cleaning-lamella, mid tibia with two very short spurs, shorter than diameter of tibia, hind tibia with inner spur nearly as long as tarsal segment 4, with a close comb of bristles, outer spur two-thirds as long, broad ovate; propodeum with dorsal surface defined by slight keels posteriorly but not at sides, half as long again as broad, spiracles rather prominent, whole surface finely coriaceous with a net-work of fine raised lines, tending to form oblique striae on the lateral surfaces. Abdomen ovate, pointed posteriorly, nearly as long as head + thorax, petiole very short, six visible tergites, surface smooth and shining, finely pubescent.

♂. Black or blackish-brown, with antennal segments 1–2 and legs somewhat paler; palpi testaceous; wings a little infuscate, pterostigma and venation brown. Surface with sparse, very short, pale pubescence. Length 3·0 mm.

Head subpyriform, the "stalk" of the pear being a short projection to which the antennae are attached, the mouth being a little in front of the dorsal occipital margin; in dorsal view transversely subrectangular, three-quarters as long as broad, sides almost parallel, posterior angles rounded; distance from eye to posterior margin of antennal socket nearly half greatest diameter of eye, distance from eye to occipital margin about as long as greatest diameter of eye; surface of head smooth and shining; clypeus moderately transverse, rather strongly convex (not keeled) with a rounded ventral margin, above clypeus two converging impressed lines extend up to antennae, defining a narrow, triangular area; distance from eye to base of mandibles about as great as that from eye to antennal socket, mandibles with four small teeth; antennae about as long as whole body, with short pubescence only, segment 1 straight, cylindrical, two-thirds as long as dorsal length of head, about half as long as 3, three times as long as broad, 2 suboval, as long as broad, 3–10 of equal thickness, 3–9 gradually decreasing in length, 3 six to seven times, 9 four to five times as long as broad, 10 as long as 6; eyes bare, oval, vertical diameter half as long again as longitudinal one; ocelli prominent, in an equilateral triangle, median ocellus well in front of line drawn through hind margin of eyes, posterior ocelli separated from occiput by four to five times distance between them; occiput with a fine complete raised margin. Pronotum transverse, posteriorly angularly emarginate, in dorsal aspect widely separated from tegulae, with a well-marked collar at a considerably lower level, surface shining with some rugosities, sides smoother; mesonotum smooth and shining, with a median impressed line on anterior third, notaulices present on anterior third, parapsidal furrows feebly impressed, complete; scutellum feebly convex, smooth and shining, separated from mesonotum by a deep but ill-defined depression; metanotum ("postscutellum") one-third as long as scutellum, rugose; mesopleuron smooth and shining, with an oblique furrow leading ventrally and posteriorly from central depression and an anterior furrow between mesopleuron and sternum which bends up posteriorly to near the central depression; metapleuron smooth and shining; wings with venation as in fig. 93; legs moderately long, hind femora little thickened, tibiae a little longer than their femora and tarsi than their tibiae, tarsi cylindrical, claws simple; fore tibia with one spur bearing a narrow hyaline cleaning-lamella, mid tibia with two rather short, narrow spurs, hind tibia with inner spur as long as fourth tarsal segment, with a close comb of bristles, outer spur two-thirds as long, moderately broad, distally rounded; propodeum with dorsal surface ill-defined, as long as broad, covered with irregular fine keels, moderately shining, posterior and lateral surfaces with similar but stronger sculpture. Abdomen elongate-ovate, truncate posteriorly, nearly as long as thorax, petiole very short, seven visible tergites, surface smooth and shining, bare.

Specimens examined : Norfolk East, Euston, ♀, 24.iv.1930 (*G. H. Mansbridge*); Suffolk West, Tuddenham Fen sweeping heathy marsh, ♂, 8.ix.1915 (M.); Cambridge, ♂, 18.x.1923 (*S. Brans*) (Ca.); Oxon, Oxford, ♂, 19.x.1904 (*A. J. Chitty*) (M.); Kent East, Huntingfield, 2 ♂♂, 13.viii.1904 and 26.ix.1903 (*A. J. Chitty*) (M.), Charing, 3 ♂♂, 27.viii.1904 (*A. J. Chitty*) (M.); Surrey, ♀ Chobham (F.), Boxhill, with *Formica fusca* L., ♂, 5.ix.1912 (B.M.D.), Horsley, ♂, 31.viii.1930 (*G. E. J. Nixon*), Oxshott, ♂, 9.viii.1930 (*G. E. J. Nixon*), New Malden, ♂, 22.viii.1930 (*A. M. Low*), Bookham, ♂, 14.ix.1929 (*G. E. J. Nixon*); Sussex East, Crowborough, ♂, 6.viii.1912 (*F. Jenkinson*) (Ca.); Berks, Tubney in sandpit, ♀, 1.viii.1921 (H.); Hants South, New Forest, ♂, 6.viii.1901 (M.), Mark Ash in *Sphagnum*, ♀, 30.x.1938 (*K. Guichard*); Dorset, Glanvilles Wootton, 11 ♂♂, 28.viii.1871, 1.x.1889, 3.x.1888, 3.x.1889, 5.x.1855, 6.x.1893, 8.x.1909, 9.x.1855, 25.x.1895, x.1893, 2.xi.1886 (H.D.); Devon North, Clovelly, ♂, 26.x.1876 (H.D.); Pembroke, Milford Haven, ♂ (F.); Scotland, Argyll, Taynuilt, 2 ♂♂, 11.ix.1894 (*A. Beaumont*) (M.); no locality, ♀, 14.x.1869 (H.D.); no data, ♀ (M.) (prob. *A. Piffard*, cf. *Proc. ent. Soc. Lond.* **1871** : xxiv), ♂ (F.), 3 ♂♂ (H.D.), 2 ♂♂ (M.), ♂ (Haliday coll.) (D.).

I have also seen a ♂ from Germany (Ruthe coll.) (B.M.).

10. The British Bethylidae (*s.s.*).

The Bethylidae is a large family of usually small insects represented in this country by nine genera of which three are introduced into warehouses. Only three species are at all common and most of the others are very rare. In habits they are somewhat intermediate between the ordinary fossorial Hymenoptera and true parasites. Usually no true nest is formed but, after paralysing its prey, the female often drags it to a sheltered position and may stand guard over it. Unlike the other fossoria, more than one egg may be laid on each host; the egg is placed externally and the mature larva spins a cocoon.

11. Key to the British genera and species of Bethylidae (*s.s.*).

1. Winged species . . . . . 2.
–. Apterous or brachypterous species . . . . . 19.
2. Antennae with 12 segments . . . . . 3.
–. Antennae with 13 segments . . . . . 13.
3. Fore-wings with pterostigma emitting a radial vein which does not enclose a cell . . . . . 9.
–. Fore-wings with venation weak, sometimes almost absent, Sc + R + M strongly thickened before pterostigma which does not emit a radial vein. Length not more than 2·0 mm. *Cephalonomia* Westwood . . . . 4.
4. Propodeum with a distinct central keel and lateral margins. Sides of head behind eyes considerably converging, only a little longer than eyes. Head with distinct punctures. Scutellum with two strong oblique impressions. Warehouse species . . . *C. tarsalis* (Ashmead) ♂♀. p. 304.
–. Propodeum with no or with indistinct central keel and lateral margins. Head with no or very indistinct punctures . . . . . 5.
5. Larger species (length 1·8 mm.). Antennae yellow with segment 1 brown. Head distinctly rounded posteriorly. Scutellum anteriorly with two very small pits separated by 5–6 times their diameter. Propodeum shagreened throughout. Outdoor species . . *C. hammi* sp. n. ♀. p. 302.
–. Smaller species (length 1·6 mm.). Antennae brown to black, sometimes with segments 2–3 or 2–4 yellow. Head rectangular in females . . . 6.

6. Males; antennae and legs entirely dark . . . . . 7.
–. Females; antennae with segments 2–3 and all tibiae yellow . . . . 8.
7. Sculpture stronger throughout. Antennal segment 1 shorter, as long as 2 + 3. Sides of head more convergent behind. Warehouse species *C. waterstoni* Gahan ♂. p. 304.
–. Sculpture weaker. Antennal segment 1 longer, nearly as long as 2 + 3 + 4. Sides of head less convergent behind. Outdoor species *C. formiciformis* Westwood ♂. p. 300.
8. Sculpture stronger, especially on head and propodeum. Scutellum with two distinct pits, separated by twice the diameter of one of them. Sides of head in front of eyes about one-half length of eye. Warehouse species *C. waterstoni* Gahan ♀. p. 304.
–. Sculpture weaker, propodeum posteriorly with two large shining areas on each side. Scutellum with a transverse impression, often shallow and ill-defined. Sides of head in front of eyes only one-third length of eyes. Outdoor species . . . . . *C. formiciformis* Westwood ♀. p. 300.
9. Smaller, length less than 1·75 mm. Venation indistinct, end of Sc + R + M strongly thickened just before the pterostigma, two basal cells of same length. Warehouse species. *Plastanoxus* Kieffer. . . . . 10.
–. Larger, length 2·2–5 mm. Sc + R + M not thickened distally. Second sector of M usually present as a short stump, the more dorsal of basal cells much shorter than costal one. *Bethylus* Latreille . . . . . 11.
10. Smaller species. Head and dorsum of thorax shining, unsculptured, propodeum finely shagreened, posteriorly shining. Head of male with median ocellus far behind the eyes . . . *P. westwoodi* (Kieffer). p. 320.
—. Larger species. Head and dorsum of thorax finely shagreened, propodeum coarsely shagreened throughout. Head of male with median ocellus in line with posterior margin of eyes . *P. munroi* sp. n. p. 320.
11. Posterior ocelli separated from hind margin of the head by not more than their diameter, by far less than the distance between them. Clypeus more produced, with a very strong keel between the antennae. Antennal segments shorter, 3–11 not more than one and a half times as long as broad. Sculpture of head weaker . . *B. dendrophilus* sp. n. p. 316.
—. Posterior ocelli separated by at least one-third distance between them from hind margin of head. Clypeus less produced. Antennal segments longer, 3–11 at least twice as long as broad. Sculpture of head stronger . 12.
12. Posterior ocelli separated from occiput by a distance $\frac{3}{5}$ to $\frac{1}{3}$ (usually about $\frac{1}{2}$) in ♀, $\frac{1}{2}$–$\frac{2}{5}$ in ♂, of distance between them. Female (much more rarely male) with wings often more or less shortened *B. fuscicornis* (Jurine). p. 308.
—. Posterior ocelli separated from occiput by a distance of $1\frac{1}{2}$ to 2 (rarely 1–$1\frac{1}{3}$ in somewhat short-winged females) in ♀, $\frac{1}{2}$ to 1 in ♂, of distance between them. Females very rarely short-winged. *B. cephalotes* (Förster). p. 306.
13. Propodeum margined posteriorly . . . . . 14.
—. Propodeum rounded posteriorly. Outdoor species . . . . . 17.
14. Scutellum with two impressions, either circular or transverse. Outdoor species. *Epyris* Westwood . . . . . 15.
—. Scutellum anteriorly with single transverse impression. Warehouse species 16.
15. Eyes hairy in both sexes. Head dull and densely alutaceous, with more or less distinct fine punctures. Front tarsi of female [25] with segments 2–3 cylindrical, 4 weakly cordiform . . . . *E. niger* Westwood. p. 322.
—. Eyes hairy in ♂, bare in ♀ (or nearly so). Head moderately shining, finely alutaceous, with numerous distinct punctures. Front tarsi of female with segments 2–4 weakly cordiform, distally emarginate *E. fraternus* Westwood. p. 323.

[25] In the females of both species of *Epyris* the costa is not produced beyond the pterostigma, whereas it is distinctly so in the male.

16. Notaulices absent. Propodeum anteriorly with five discal keels. Wings with a dark discal spot . . . *Holepyris hawaiiensis* (Ashmead). p. 328.
—. Notaulices developed. Propodeum anteriorly with three discal keels. Wings hyaline . . . *Rhabdepyris zeae* Turner and Waterston. p. 326.
17. Proximal part of second sector of M present, first sector strongly thickened where it leaves the costa, but Cu1 ending at point where Cu2 leaves it *Goniozus claripennis* (Förster) ♂♀. p. 330.
—. Second sector of M completely absent, first sector not thickened, but Cu1 present as a distinct vein for a considerable distance beyond divergence of Cu2. ♂♂ . . . . . 18.
18. Eyes hairy. Scutellum with a strong transverse impression anteriorly. Larger species, abdomen red . . *Pristocera depressa* (Fabricius). p. 332.
—. Eyes bare. Scutellum with no transverse impression. Smaller species, abdomen black . . . *Pseudisobrachium subcyaneum* (Haliday). p. 334.
19. Testaceous species. The propodeum strongly contracted where it joins thorax, cordiform in dorsal view. Antenna with 13 segments. Wings absent. ♀♀ . . . . . 20.
—. Black species. The propodeum not contracted where it joins thorax, subrectangular (rounded posteriorly) in dorsal view. Wings present, at least as scale-like rudiments . . . . . 21.
20. Propodeum produced anteriorly, so that it projects into an emargination of mesonotum. Head not much longer than broad, finely punctured *Pristocera depressa* (Fabricius). p. 332.
—. Propodeum not produced anteriorly. Head considerably longer than broad, strongly punctured . . *Pseudisobrachium subcyaneum* (Haliday). p. 334.
21. Antennae with 13 segments. Propodeum margined posteriorly *Epyris brevipennis* Kieffer. p. 325.
—. Antennae with 12 segments. Propodeum not margined posteriorly . . 22.
22. Length not exceeding 1·5 mm. Wings represented by minute scales *Cephalonomia formiciformis* Westwood. p. 300.
—. Length at least 2·0 mm. . . . . 23.
23. Wings not extending beyond scutellum. Mesonotum shorter, head longer *Bethylus fuscicornis* (Jurine) var. p. 308.
—. Wings extending to first or second abdominal segment. Mesonotum longer, head shorter . . . . . *Bethylus fuscicornis* (Jurine). p. 308.

12. Descriptions of the British Bethylidae (*s.s.*).

Cephalonomia Westwood, 1833b.

Small black or (in non-British species) brownish or yellowish insects. Wings often more or less reduced, three types of species being recognisable in this respect:

(1) Both sexes macropterous (e.g. *C. tarsalis* (Ashm.)).

(2) ♂ macropterous, ♀ macropterous or brachypterous (e.g. *C. formiciformis* Westw.).

(3) ♂ macropterous or apterous, ♀ apterous (non-British species of pale colour, *cf.* van Emden, 1931); fore-wings (fig. 95) with a pterostigma, not emitting a radial vein, preceded by a "prostigma" or thickened end of Sc + R + M, rest of Sc + R + M present as a thin vein, Cu1 + 1A and 2A either distinct or hyaline; hind-wings with anal lobe reduced, with one (probably) straight proximal and three curved distal hamuli. Mandibles with one large ventral and two small dorsal teeth. Antennae with twelve segments. Eyes small. Ocelli present. Occiput not margined. Mesonotum without notaulices, parapsidal furrows feebly indicated in macropterous forms, scutellum and mesonotum sometimes fused. Mesopleuron with a central fovea but not partially separated from mesosternum by a furrow; tibiae not spiny. Propodeum with dorsal surface more or less defined by a posterior and

by lateral keels. Abdomen of female with transverse posterior impressions on tergites 2–4.

Genotype (genus monobasic) = *Cephalonomia formiciformis* Westwood, 1833b.

Synonyms. *Holopedina* Förster, 1850. Genotype (genus monobasic) = *Scleroderma* (*Holopedina*) *polypori* Förster, 1850 = *C. formiciformis* Westwood, 1833b; *Ateleopterus* Ashmead, 1893. Genotype (genus monobasic) = *A. tarsalis* Ashmead, 1893. The genus is recorded from all of the main regions except the Australian.

Cephalonomia formiciformis Westwood.

Cephalonomia formiciformis Westwood, 1833b.
Scleroderma (*Holopedina*) *polypori* Förster, 1850.
Cephalonomia formiciformis var. *sulcata* Kieffer, 1906.
Cephalonomia sulcata Kieffer, 1914.

♀ (macropterous). Black; mandibles and antennae dark brown, segments 2 and 3 (sometimes also 4) pale yellow; legs dark brown to black, tibiae and tarsi yellow, a more or less considerable area in central part of tibiae darkened; wings hyaline. Length 1·5–1·6 mm.

Head (fig. 96) shining, very finely shagreened, punctures extremely few and fine; head at least one and a half times as long as broad, almost parallel-sided; sides of head in front of eyes not more than one-third, sides of head behind eyes nearly twice, length of eyes; ocelli in an almost equilateral triangle, median ocellus far behind line drawn through hind margin of eyes, posterior ocelli removed from occiput by half distance that they are from one another; antennae, if laid back, extending to about mid point of mesonotum, segment 1 distinctly thickened and curved, about two and a half times as long as broad, a little longer than 2 + 3 + 4, segment 2 somewhat globose, about one and one-third times as long as broad, a little longer than 3 + 4, antennae gradually a little thickened distally, 3–6 a little transverse, 7–11 quadrate, 12 nearly twice as long as broad, shorter than 10 + 11. Lengths of pronotum, mesonotum and scutellum as 12 : 4 : 6; surface of pronotum shining and very finely shagreened, mesonotum and scutellum almost not shagreened; scutellum in front with a transverse depression, often shallow and ill-defined; propodeum with dorsal surface very weakly defined at sides and posteriorly half as long again as broad, surface finely shagreened with a large area on each side which is smooth and shining; fore-wings with veins Cu1 + 1A and 2A indicated though hyaline.

♀ (brachypterous): similar but lengths of pronotum, mesonotum and scutellum as 12 : 3 : 4; propodeum rather shorter; wings brownish, scale-like, pyriform with posterior margin rounded, reaching back as far as hind margin of scutellum.

♂ (macropterous): resembles ♀ except in the following particulars: antennae entirely dark; legs black, trochanters and tarsi brown; size a little smaller.

Head (fig. 97) broader and shorter, sides more converging in front and behind, sides of head in front of eyes, which are a little larger and more convex, about one-third as long as eyes, sides of head behind eyes about one and one-third times as long as eyes; antennae, if laid back, reaching a little beyond front margin of scutellum, segment 1 moderately curved and thickened, about two and a half times as long as broad, nearly as long as 2 + 3 + 4, segment 2 about one and a half times as long as broad, as long as 3 + 4, segments 3–11 gradually becoming each a little longer though hardly thicker, 3 quadrate, 11 one and a third times as long as broad, 12 two and a half times as long as broad, shorter than 10 + 11; ocelli in an equilateral triangle, median ocellus only a little behind line drawn through hind margin of eyes, posterior pair separated from occiput by rather less than they are from one another.

Specimens examined : [26] Type m. ♀ *Cephalonomia formiciformis* Westwood, without habitat data, but according to Westwood found in mushroom-like fungus near London; Cambs, Wicken Fen, 3b. ♀♀ 1 m. ♀ 1 ♂ with *Cis* sp. viii.1913 (*C. J. C. Pool*) (B.M.); Gloster West, Wotton-under-Edge, 2 ♂♂, viii.1921 (*R. C. L. Perkins*) (B.M.); Oxon, Shotover, 1 m. ♀ with *Cis setiger* Mel. (= *villosulus* Marsh.) 1912 (*A. H. Hamm.*) (H.), 1 m. 2 b. ♀♀ in fungus on birch stump with *Cis bidentatus* Ol. (*A. H. Hamm.*) (H.); Bucks, Burnham

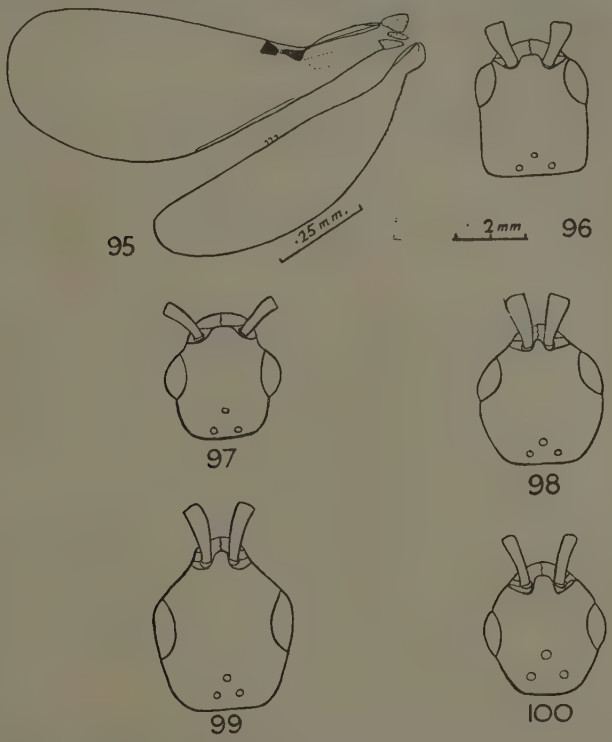


Fig. 95.—Left wings of *Cephalonomia formiciformis* Westw. macropterous ♀.
Fig. 96.—Same species, dorsal view of head ♀.
Fig. 97.—Same species, dorsal view of head ♂.
Fig. 98.—Dorsal view of head of ♀ *Cephalonomia hammi* sp. n. (Some specimens have the head squarer than the one figured.)
Fig. 99.—Dorsal view of head of *C. tarsalis* (Ashmd.) ♀.
Fig. 100.—Same species, dorsal view of head of ♂.

Beeches, polyporus collected from birch, 1.x.1933, 18 m. 7 b. ♀♀, 5 ♂♂, 18.ii. to 19.iv.1934 (*O.W.R.*); Middlesex, Heston, 1 m. ♀ 11.viii.1935 (*H. St. J. K. Donisthorpe*) (B.M.), Stanmore, 2 b. ♀♀ 3.iv.1931 (Bl.), Enfield, 1 m. ♀ 2.vii.1907 (*H. St. J. K. Donisthorpe*) (H.W.), 1 b. ♀ on *Cis fuscatus* Mel. (= *castaneus* Mel.) 1 ♂ with *Cis pygmaeus* Marsh., 1 m. ♀ with *Cis boleti* Scop. (*C. J. C. Pool*) (B.M.); Essex, Epping, 1 b. ♀ with *Cis pygmaeus* Marsh., 23.i.1926 (B.M.), 2 b.

[26] m. = macropterous, b. = brachypterous. All ♂♂ are m.

♀♀ with *Cis hispidus* Pk., 10.ix.1907 (*C. J. C. Pool*) (B.M.); Kent East, Faversham, 1 b. ♀ 1901 (*A. J. Chitty*) (M.); Surrey, Oxshott, 2 m. ♀ in polyporus on birch with *Cis bilamellatus* Fowler, 18.ix.1924 (*O.W.R.*), Boxhill, 1 b. ♀ 11.vi.1927 (Bl.), Ashtead 1 m. 3 b. ♀♀ (P. Cameron coll.) (B.M.); Berks, Windsor Forest, 2 b. ♀♀ with *Cis*, 1 b. ♀ 1.viii.1928, 1 b. ♀ with *Cis boleti* Scop. 26.vii.1925, 1 m. ♀ with *Cis fuscatus* Mel. (= *castaneus* Mel.) 27.vii.1931, 1 b. ♀ with *Cis bilamellatus* Fowl. on sulphur bracket (*H. St. J. K. Donisthorpe*) (B.M. and coll. Nixon); Somerset North, Shapwick, 1 m. ♀ turf moor with *Cis*, 24.vi.1933 (M.); Devon South, Bovey Tracey, 2 m. ♀♀ on oak stump, viii.1929 (*R. C. L. Perkins*) (B.M.); no data, 1 b. ♀ 31.vii.1904 (M.), 1 b. ♀ 3 m. ♀♀ 1 ♂ (H.W.).

I have also examined 2 m. ♀♀ labelled "Aachen, *Omalus polyporii* det. Förster." These are probably part of the original material of *Cephalonomia polypori* (Först.) which was found in fungus on an oak tree. Giraud (1877 : 453) bred *C. formiciformis* with *Cis laminatus* Mel., *Dorcatoma setosella* Muls. and *Synoxylon sexdentatum* Ol. This is the material on which Kieffer (1905 : 235, 458) founded his *C. sulcata*, which is almost certainly not distinct. Maneval (1935) also records *C. sulcata* Kieffer from fungus containing *Ennearthron affine* Gyll. in France.

From the preceding records it is clear that *C. formiciformis* is found from June to Sept.; the specimens which I bred were kept indoors and probably emerged abnormally early. The proportions of the sexes and of the two types of females work out as follows : 34 m. ♀, 30 b. ♀, 11 ♂. The species preys upon species of *Cis* (Coleoptera, Cisidae) and probably allied genera but the behaviour of the ovipositing female has not been described in this species.

Cephalonomia hammi sp. n.

C. mycetophila Richards, 1936 *nec* Kieffer, 1906.

♀. Black; mandibles yellow-brown; antennae yellow, first segment brown; distal segments sometimes a little darker; legs brown; all tibiae and tarsi yellow-brown to brown; wings hyaline. Length about 1·8 mm.

Head (fig. 98) shining, very finely shagreened, punctures almost completely absent: head a little longer than broad, broadest a little behind front margin of eyes, sides strongly converging in front of eyes, only moderately so behind them; sides of head in front of eyes less than half as long as eyes; sides of head behind eyes about one and a half times as long as eyes; antennae, if laid back, reaching to about posterior margin of mesonotum, segment 1 considerably thickened and curved, about two and a half times as long as broad, longer than 2 + 3 + 4, shorter than 2 + 3 + 4 + 5, segment 2 about one and a third times as long as broad, a little shorter than 3 + 4, 3–11 all rather thick, quadrate, 12 about twice as long as broad, nearly as long as 10 + 11. Lengths of pronotum, mesonotum and scutellum as 10–12 : 4 : 5, mesonotum sculptured like head, pronotum and scutellum more shining; scutellum in front with two very indistinct punctiform impressions, separated by 6–7 times their diameter; propodeum with dorsal surface feebly defined at sides, not at all posteriorly; surface finely shagreened (though considerably more strongly than head) posteriorly, becoming perceptibly more shining, though still finely shagreened. Fore-wings with Cu1 + 1A and 2A distinctly indicated.

Type ♀ Oxon, Oxford (parent), 4.viii.1918 and 4 ♀♀ paratypes (offspring), bred from Coleopterous larva (? *Cis.* sp.) (*A. H. Hamm*) (H.W.).

The female was found on 4.viii.1918 carrying a Coleopterous larva in her mouth; later four eggs were found on this, and on 4.x.1918 these gave rise to four adults (*see* Poulton, 1922).

The above species runs down to *C. mycetophila* Kieffer in Kieffer's key, and one specimen (Richards, 1936 : 170) was kindly compared with one of Kieffer's specimens by Mons. L. Berland. Nevertheless, during a visit to Paris in 1938, a special study was made of the species and the previous conclusion must be revised.

Kieffer (1906 : 455) described *C. mycetophila* from Amiens (*Carpentier*) and Inde-et-Loire, St. Ephraim (*de Gaulle*). Carpentier's collection is probably lost and his specimens include the type. de Gaulle's specimen, which still exists at Paris and is now marked type, was noted by Kieffer to differ from the type in having the median nerve brown and as a matter of fact the venation is very distinct. This specimen is clearly a different species from Hamm's, for which I therefore propose a new name. de Gaulle's specimen is also almost certainly a different species from *C. mycetophila* Kieffer; the latter name had better be dropped entirely until Carpentier's collection can be rediscovered.

Cephalonomia venata sp. n.

C. mycephetophila Kieffer, 1906 (in part).

♀. Black; legs and antennae brownish, segment 1 of latter darker, segment 2 more yellow. About the same size as *C. formiciformis* Westw. Head (not easy to see owing to method of mounting) shining, hardly perceptibly alutaceous, not punctured; one and a third to one and a half times as long as broad, rectangular, very little rounded behind; sides of head in front of eyes one-third as long as eyes; sides of head behind eyes one and a third times as long as eyes; antennal segment 1 a little longer than 2 + 3; keel between the antennae stronger than in any other species examined. Lengths of pronotum, mesonotum and scutellum as 5 : 2 : 3, mesonotum feebly alutaceous, not punctured; scutellum in front with a transverse furrow which is somewhat expanded at the sides; propodeum with dorsal surface moderately distinctly defined at sides, not at all posteriorly; surface moderately strongly shagreened in front and down centre to near hind margin, the rest shining. Fore-wings with Cu1 + 1A and 2A distinctly brown.

Type ♀ France, Inde-et-Loire, St. Ephraim (*de Gaulle*) (P.). A brachypterous specimen mounted on the same pin seems to be *C. formiciformis* Westw.

Cephalonomia nigrescens Kieffer.

While I was at Paris I also studied a specimen of *C. nigrescens* Kieffer, 1906 : 461. (♀ Pyrenées (*André.*)) This is probably the type. It is very much hidden by the gum in which it is mounted but is certainly a distinct species in the broad head and in the fusion of the scutellum with the mesonotum.

Cephalonomia brevipennnis Kieffer.

This species was described (1906) from specimens from Surrey (coll. Cameron) and Notts, Sherwood Forest (*T. A. Marshall*). None of these specimens can now be traced. Kieffer distinguished it especially because it had short wings, extending to the anterior part of the propodeum and no ocelli. He did not realise that *C. formiciformis* Westw. has short wings (a little shorter than this) also. One of Kieffer's specimens had wings extending to the end of the propodeum and had ocelli; I have seen no specimen like this. I suspect that *C. brevipennis* is only a synonym of *C. formiciformis*.

Cephalonomia waterstoni Gahan, 1931.

Very close to *C. formiciformis* Westwood but differing as follows: ♀. Antennae black except for segment 2 and usually part of segment 3. Head considerably more strongly shagreened, except on disc immediately behind antennae; length: breadth as 20 : 13 (Gahan in his original description says 20 : 16 but I think his figure which shows 20 : 13 is correct); sides of head in front of eyes about one-half length of eye, sides of head behind eyes about one and a half times length of eye; antennae a little longer, segment 1 not longer than 2 + 3 + 4, segment 2 longer, fully one and a half times as long as broad, remaining segments quadrate, 12 twice as long as broad. Whole thorax more strongly shagreened; scutellum anteriorly with two rather clearly defined pits, separated by nearly twice the diameter of one of them; dorsal surface of propodeum more strongly shagreened, the shining posterior areas not very obvious, faint central keel more or less indicated. Apparently always macropterous.

♂ differs from male of *C. formiciformis* Westwood as follows: Head rather duller; sides of head in front of eyes only one-quarter length of eye, sides of head behind eyes more convergent, only a little longer than length of eye; antennae, if laid back, reaching at least to hind margin of scutellum, segment 1 moderately curved, two and one-third times as long as broad, as long as 2 + 3, 2 twice as long as broad, a little longer than 3 + 4, 3–11 gradually becoming a little longer, 3 quadrate, 11 one and a third times as long as broad, 12 as long as 10 + 11. Lengths of pronotum, mesonotum and scutellum as 10 : 4 : 5; scutellar pits feeble; thorax and propodeum more strongly shagreened.

Specimens examined: Durham, 3 ♀♀ Sunderland in wheat, *ex* Fremantle, Australia; Lancs South, Manchester, ♀ in wheat *ex* Sydney, Liverpool, 4 ♀♀ in wheat *ex* Fremantle and Sydney; London, ♂♀ in wheat *ex* Sydney; Cornwall West, Falmouth, 3 ♀♀ in wheat *ex* Sydney; Lanark, Glasgow, 3 ♀♀ in wheat *ex* Sydney and Geelong; Cork (probably East), Cork, ♀ in wheat *ex* Sydney. The specimens were all collected by members of the Royal Society Grain Pests (War) Committee and are numbered; the key to the numbers is given by Durrant (1921). Gahan (1931) also recorded it from the United States. It is probably parasitic on one of the numerous grain beetles.

Cephalonomia tarsalis (Ashmead).

Ateleopterus tarsalis Ashmead, 1893.
Cephalonomia tarsalis Gahan, 1931.
C. carinata Kieffer, 1907b.
C. kiefferi Fouts, 1920.
C. sp. Myers, 1929.

♀. Black; mandibles brownish-yellow; antennae brown, segment 1 distally and whole of 2 paler; legs brown, fore tibiae, mid and hind tibiae narrowly proximally and distally, all tarsi pale yellow; wings hyaline, hardly perceptibly brownish distally. Length about 2·0 mm.

Head (fig. 99) shining, very finely shagreened, with very sparse and fine, but still quite perceptible punctures; head a little longer than broad, broadest just behind front margin of eyes, sides converging both in front and behind; sides of head in front of eyes about two-thirds length of eye, sides of head behind eyes about one and a quarter times length of eye; antennae, if laid back, extending a little beyond the scutellum, segment 1 somewhat curved, thickened distally, nearly three times as long as broad, as long as 2 + 3 + 4, 2 about twice as long as broad, as long as 3 + 4, 3–11 all of same thickness, about quadrate, 12 two and a half times as long as broad, as long as 10 + 11; ocelli in a triangle the posterior side of which is a little shorter than two others, median ocellus a little behind line

drawn through hind margin of eyes, posterior ocelli as far from occiput as distance between them. Lengths of pronotum, mesonotum and scutellum as 10 : 4 : 5, these parts sculptured like the head, but punctures almost absent except on mesonotum; notaulices and parapsidal furrows feebly indicated; scutellum anteriorly with two rather strong, oblique impressions, usually separated by rather more than width of one of them, sometimes nearly joined; propodeum with dorsal surface defined laterally and posteriorly by distinct keels, half as long again as broad, with a distinct central keel, surface rather coarsely shagreened and dull, becoming only slightly less shagreened and more shining posteriorly. Fore-wings with Cul + 1A and 2A distinctly indicated. Brachypterous forms not known.

♂ similar to ♀ but antennae entirely dark. Size a little smaller. Length 1·7 mm. Sides of head (fig. 100) more strongly converging both in front and behind; antennae, if laid back, extending to posterior margin of propodeum, segment 1 less thickened, shorter than 2 + 3 + 4, longer than 2 + 3, 2 about twice as long as broad, a little shorter than 3 + 4, 3–11 very gradually increasing in length, 3 one and a quarter times as long as broad, 11 one and two-thirds times as long as broad, 12 three times as long as broad; scutellum in front with a single strong transverse impression, surface a little more convex; propodeum with dorsal surface definitely becoming more shining on each side posteriorly, only one and a quarter times as long as broad.

Specimens examined : London, dried fruit warehouse, 4 ♂♂, 7 ♀♀, ix.1928 with *Oryzaephilus surinamensis* (L.) (*O.W.R.*); Yorks North East, Whitby, ♀, 21.i.1937, amongst rice with many *Tribolium castaneum* (Herbst) (*H. Britten, jr.*) (B.).

I have also examined the type ♀ of *Cephalonomia carinata* Kieffer which was described from Albania and a male and female found in dates at Basra (*V. H. W. Dowson*). Fouts' specimens of his *C. kiefferi* were bred from *Sitophilus* (*Calandra*) *oryzae* (L.). Myers (1929) described how it attacks the larvae of *O. surinamensis* (L.) in Australia, where the beetle was common in dried grapes.

Bethylus Latreille, 1802.

Moderate-sized to small black insects with paler legs and antennae. Wings often more or less reduced, especially in female. Fore-wings (fig. 101) with a pterostigma emitting a distally strongly hooked radial vein, end of Sc + R + M not thickened, Cu1 + 1A and 2A enclosing cells of which that enclosed by former is considerably longer than that by latter, veinlet representing second sector of M very short, Cu1 not produced beyond mcu; hind wings with a distinct anal lobe; a set of straight proximal hamuli, of which two are stronger and three curved distal hamuli. Mandibles with a broad dorsal and three small ventral teeth. Antennae with twelve segments. Eyes rather small. Ocelli present. Occiput not margined. Mesonotum with no notaulices, parapsidal furrows indicated, no deep depression, only a narrow impressed line separating off scutellum. Mesopleuron with a central fovea but not partially separated from mesosternum by a furrow. Tibiae not spiny. Propodeum with dorsal surface defined by keels at sides only. Abdomen with tergites 2–4 or 2–5 with transverse posterior impressions, much more distinct in female.

Genotype (fixed by the International Commission on Zoological Nomenclature) = *Omalus fuscicornis* Jurine, 1807.

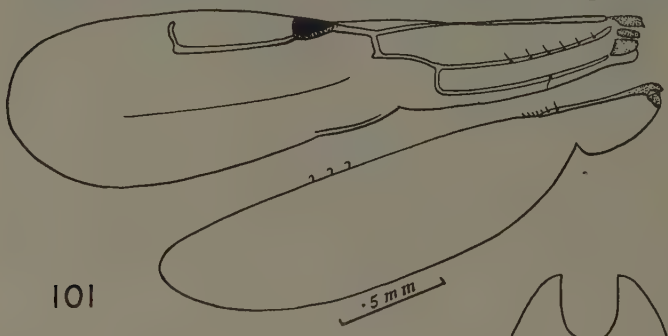
Synonyms : *Perisemus* Förster, 1856 (genotype *P. triareolatus* Förster, 1856, fixed by Ashmead, 1893); *Episemus* Thomson, 1862 (genotype here fixed as *E. variabilis* Thomson, 1862).

The genus is recorded from Europe, North Africa and U.S.A.

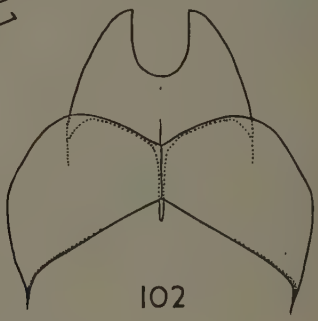
Bethylus cephalotes (Förster).

Perisemus cephalotes Förster, 1860.
Bethylus fuscicornis Curtis, 1838 *nec* Jurine, 1807. **syn. n.**

♀. Black; antennae with segment 1 distally and next few segments, fore tibiae, mid tibiae often proximally, more rarely distally, rarely hind tibiae, proximally, all tarsi

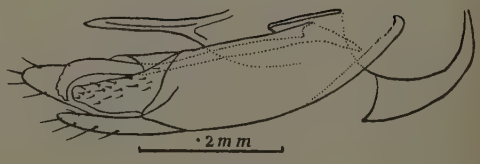


101



102

103A



103B

Fig. 101.—Left wings of *Bethylus cephalotes* (Först.) ♀.
Fig. 102.—Same species, ventral view of eighth and ninth abdominal sternites ♂.
Fig. 103.—Same species, genitalia (a) dorsal, (b) ventral view ♂.

testaceous. Wings hyaline, usually more or less strongly suffused with brown, sometimes on distal half only; venation pale, pterostigma and radial vein dark. Length 3·0–5·0 mm.

Head subquadrate, a little longer than broad, hind angles rounded, occiput feebly emarginate (especially in large-headed specimens), considerably broader than thorax, surface dull, closely alutaceous, with sparse, fine, shallow punctures (separated by at least 4–5 diameters), with moderately long, white, backwardly directed hairs arising from

punctures; eyes short oval, bare, almost meeting mandibles in front, separated by about one and a third times their length from occiput; clypeus strongly transverse, with a central keel which extends back between the antennal sockets to some distance behind them; sockets separated by one and a half times distance from outer edge of one of them to eyes; antennae with short white pubescence, if laid back extending to about posterior margin of pronotum, segment 1 thick, a little curved, about two and a half times as long as broad, a little longer than 2 + 3, 2–7 all a little clavate, 2–4 about two and a half times as long as broad, 5–7 becoming a little shorter, 8–12 moniliform, about twice as long as broad; vertex often with a slight longitudinal impression in front of ocelli which are in an isosceles triangle; distance between posterior ocelli usually about three-quarters, but sometimes equal to that between one of them and median ocellus, posterior ocelli usually separated from occiput by twice as much as they are from one another (1·5–2·5 times); occiput not margined. Pronotum rounded in front, a little broadened behind, sinking in a regular curve to anterior collar, about three-quarters as long as posterior width, half as long again (or rather longer) as the mesonotum, surface a little shining, finely alutaceous with very sparse fine punctures; lateral aspect only very slightly vertically impressed, more coarsely alutaceous; mesonotum sculptured like pronotum but with fewer punctures, nearly twice as broad as long; scutellum flat, more finely sculptured than mesonotum, with small, hardly recognisable, antero-lateral depressions, posteriorly overlapping the central part of the metanotum (" postscutellum "); mesopleuron convex, with a circular dorsal pit, surface rather dull, alutaceous; metapleuron almost indistinguishably fused with mesopleuron; propodeum with dorsal surface not defined, except by lateral keels which are rather below the level of surface, posteriorly sloping almost regularly to attachment of abdomen, surface about quadrate, dull and alutaceous, with a narrow central shining area which broadens posteriorly; lateral surfaces dull and alutaceous. Legs stout, especially fore femora; mid and hind femora somewhat hollowed out beneath to receive the tibiae, which are not spinose; fore tarsi with basitarsus comprising nearly half total length of tarsus, segments 2–4 short cordiform; mid and hind tarsi with segment 3 subcordiform, segment 4 cordiform and deeply emarginate, claws with a broad, truncate basal process. Wings (fig. 101) narrow, section of R between base of M and pterostigma nearly twice as long as pterostigma which is pyriform (subtruncate apically), about two-thirds as broad as long; radial vein 5–6 times as long as pterostigma, proximal part nearly straight, distal part strongly curved but not reaching costa; hind-wings with a short thick costal vein and a very short " cubital " one; wings as long or nearly as long as abdomen. Abdomen with seven clearly visible tergites, surface shining, scarcely alutaceous, with a few hairs, tergites 2–4 (sometimes also 5) posteriorly impressed, impression triangularly broadened on disc; lateral lobes of sting with small stylets between them usually a little protruded.

♂. Similar; mandibles usually a little pale distally. Size rather smaller. Ocelli usually in an equilateral triangle; posterior ocelli rather nearer occiput, from which they are separated by 1·35 to 1·5 times the distance they are from one another. Abdomen with seven tergites, usually broader and more truncate posteriorly, tip of genitalia sometimes visible; first sternite very small, falling perpendicularly on to depressed anterior part of second; seventh broadly emarginate, eighth (morphological ninth) with two antero-lateral apodemes (fig. 102), sternite fitting into emargination of seventh, posteriorly more than semicircularly emarginate; genitalia as in fig. 103.

Specimens examined :—52 ♂♂ and 196 ♀♀ including specimens from the following vice-counties : Yorks North East, Lancs North and South, Cheshire, Shropshire, Notts, Staffs, Leicester, Norfolk East, Suffolk East and West, Cambs, Warwick, Worcester, Hereford, Gloster East, Oxon, Bucks, Herts, Middlesex, Essex North, London, Kent East and West, Surrey, Sussex East and West, Berks, Hants South, Is. of Wight, Dorset, Somerset North and

South, Devon North and South, Cornwall East and West, Scilly Isles, Glamorgan, Sligo, Dublin, Wicklow, Wexford, West Meath, Louth and Down. I have also seen a female from Corsica (F.). Of Curtis' specimens sent from Melbourne Museum two females labelled *fuscicornis* Jur. are both the present species, and the same is true of all specimens under that name in the Dale coll. Occasionally the wings are a little shortened but even this is very rare and no forms approaching the very brachypterous types of *B. fuscicornis* (Jur.) have been seen. A male, E. Cornwall, St. Merryn, vii.1925 (Bl.) is abnormal in having the entire propodeum dull. A more detailed study of the variation will be found under *B. fuscicornis* (Jur.).

The dates of capture of *B. cephalotes* are given in a table (p. 316) with *B. fuscicornis* (Jur.). The males are found from May to October and the females throughout the year, hibernating in the adult stage. It is uncertain whether the females which emerge from hibernation in April and May give rise to one, two or more generations; at least two generations would seem probable.

The literature on the biology of this and the next species is very confused; this unfortunately is true also of a summary previously published by myself (Richards, 1932). The specimens whose habits at Slough I recorded there under the name *B. cephalotes* are really *B. fuscicornis* (Jur.). Nielsen's record (1905) of *Perisemus fulvicornis* probably applies to *B. cephalotes* (Först.). Kieffer (1906 : 522) identified one of Nielsen's specimens and although he often made erroneous determinations, it is unlikely that he did so in the present instance. The record of *B. fuscicornis* (Jur.) attacking *Blastodacna atra* (Hw.) also applies to *B. cephalotes* (Först.), at least judging by a specimen preserved in the British Museum. Our present knowledge of the biology of *B. cephalotes* (Först.), is, therefore, as follows. The insects are found on grass, etc., or on leaves of shrubs, in winter at roots of grass. Records from ants' nests (Donisthorpe, 1927a : 107, (as *B. formicarius*), with *Lasius fuliginosus* (Latr.); O.W.R., Scilly Isles with *Tetramorium caespitum* (L.)) are merely accidental. Giraud (according to Kieffer, 1905 : 238) bred it from bramble stems at Nice. Marchal (according to Berland, 1928 : 100) found it carrying a relatively large caterpillar. Nielsen (1905) (as *Perisemus fulvicornis*) records the habits in Denmark. He split open a bramble stem in which was the abandoned nest of a *Pemphredon*. A few inches from the entrance was a Tortricid larva and a *Bethylus* female, which tried to carry its prey still further in. Still higher up the burrow was another Tortricid larva sucked almost dry by three larvae of the wasp. The prey first found appeared to be paralysed. The habits resemble those of the fossorial wasps, except that more than one egg is laid on the prey.

I found a female of *B. cephalotes* in a folded leaf of dandelion with the larva of *Cnephasia* sp. (TORTRICIDAE), at Slough, Bucks, 15.vi.1936. At time of capture, the larva had not been attacked.

Bethylus fuscicornis (Jurine).

Omalus fuscicornis Jurine, 1807.
Bethylus syngenesiae Haliday, 1834.
Bethylus fulvicornis Curtis, 1838.
Perisemus triarcolatus Förster, 1856.
? *Bethylus mandibularis* Kieffer, 1904a.
Bethylus fuscicornis Kieffer, 1905.
Bethylus fulvicornis var. *brevipennis* Hellén, 1920.
Bethylus berlandi Arlé, 1929. **syn. n.**
nec Bethylus fuscicornis Curtis, 1838.

♀. Resembles *B. cephalotes* (Först.) except in the following particulars: mandibles usually dark, rarely yellow, segment 1 and next few segments usually more extensively

pale; mid tibiae usually proximally and distally, sometimes entirely, pale; hind tibiae often pale proximally and distally; wings usually less darkened. Length 3·0–4·0 mm.

Head never so big as in largest females of *B. cephalotes* (Först.); punctures and bristles usually rather more numerous; ocelli nearly always in an equilateral triangle, median ocellus always a little smaller than posterior ones, in some short-winged forms very reduced, posterior ocelli separated from occiput by about half (0·4–0·6 times) as much as they are from one another. Wings nearly always shorter and narrower, extending to about posterior margin of fourth tergite or less (sometimes very reduced).

♂. Resembles ♀ except in the following particulars: mandibles and antennae entirely pale; legs on the average paler. Length 2·3–2·5 mm.

Wings usually as long as the abdomen, sometimes shortened; abdomen posteriorly broader and more truncate; antero-lateral apodeme of eighth sternite much shorter than in *B. cephalotes* (Först.); genitalia extremely similar to *B. cephalotes* (Först.), but ventral process of sagitta smaller.

Specimens examined: 54 ♂♂ and 151 ♀♀ including specimens from the following vice-counties, Yorks North East and Mid West, Lancs South, Norfolk East, Suffolk East and West, Cambs, Gloster West, Oxon, Bucks, Essex South, London, Kent East, Surrey, Sussex East and West, Berks, Hants South, Is. of Wight, Dorset, Devon North and South, Denbigh, Glamorgan, Moray, Inverness East, Mull, Argyll, Elgin, Perth North, Aberdeen South, Stirling, Renfrew, Ayr, Dumfries, Donegal East, Sligo, Leitrim, Down, West Meath, Dublin, Carlow, Wicklow, Wexford. I have also examined two males of *B. fulvicornis* from Curtis' collection at Melbourne; one is labelled "sandhills, Ireland, 5th August." The following continental specimens have also been examined: Finland, ♀ Aitolahti (*V. Saarinnen*) (Ca.); Sweden, nr. Stockholm, ♂, 3 ♀♀, 20.viii.1933 (*G. J. Kerrich*) (Ca.); France, Hautes Alpes, Ailefroide, ♀, 22.vii.1931 (*O.W.R.*); Spain, Sierra Nevada, ♀, 16–21.vii. (*P. Cameron*) (B.M.).

I have also examined 3 ♀♀ (one headless) France, Vendée, Île de Noirmoutier (P.) which have the posterior ocelli nearer the occiput than usual, almost as in *B. dendrophilus* sp. n. The antennae and clypeus, however, are quite normal and the ocelli are in an equilateral triangle. A similar aberrant specimen is a ♀, Italy, Naples (Costa) (P.).

The type of *Bethylus berlandi* Arlé, 1929 (France, Yonne, St. George-sur-Beaulche, 7.viii.1928) is in the Paris Museum. It is a male of *B. fuscicornis* in which the wings extend to the end of the scutellum, the thorax is not narrower than usual but the head is rather more shining.

B. fuscicornis (Jur.) seems to be less common than *B. cephalotes* (Först.) in the south of the British Isles, but to extend farther north and probably to be commoner there.

Considerable attention has been paid to variation in the present species and in *B. cephalotes* (Först.), not only because the problem of wing-dimorphism is of intrinsic interest but because the line of separation between extreme variants is not very clearly cut.

Some of the variable characters were only studied in part of the specimens, of which some were returned to the owners before the completion of the work.

(*A*). *Colour variation.*

1. *Mandibles.*

In *B. fuscicornis* (Jur.) ♀, the mandibles are dark in 38 specimens, and yellow in 1; in the males they are always yellow.

In *B. cephalotes* (Först.) ♀ they are always dark; in the males they are usually dark with a very small distal reddish area (10 specimens), sometimes dark with the distal half or more reddish (5 specimens).

2. *Antennae.*

Segment 1 is always more or less pale distally, in both species. The following classes may be recognised: distal $\frac{1}{3}$ (I), distal $\frac{1}{2}$ (II), distal $\frac{3}{4}$ (III), entire segment (IV), pale. The following frequencies were observed :—

	I.	II.	III.	IV.
B. fuscicornis (Jur.) ♀ . .	9	12	11	7
,, ,, ♂ . .	0	1	0	9
B. cephalotes (Först.)♀ . .	17	34	6	1
,, ,, ♂ . .	2	7	4	2

The flagellum varies in colour from dark, with segments 2–3 more or less pale, to entirely pale. In the following tabulation, segments, more of which were pale than dark, are treated as pale and *vice versa*.

Antennal segments pale:	2–3	2–4	2–5	2–6	2–7	2–8	2–12
B. fuscicornis (Jur.) ♀ .	2	19	11	3	1	1	1
,, ,, ♂ .	0	0	0	0	0	0	10
B. cephalotes (Först.) ♀ .	6	23	13	10	4	1	1
,, ,, ♂ .	0	0	2	4	2	1	6

3. *Legs.*

The femora are always almost entirely dark, except in the male of *B. fuscicornis* (Jur.), where the distal third of the fore femora is yellow in rather less than half the specimens. The tarsi are always pale in both species and the fore tibiae are always pale in *B. fuscicornis* (Jur.) and *B. cephalotes* (Först.) male. In *B. cephalotes* (Först.) female the fore tibiae vary as follows: ♀♀ entirely pale, 53; tibiae with a small dark mark at centre, 4; with a large dark mark, 1.

The mid and hind tibiae vary in colour as follows: I, entirely dark; II, narrowly pale proximally; III, narrowly pale both proximally and distally; IV, entirely brown to light brown; V, entirely yellow.

Species	Tibia	Colour-class				
		I	II	III	IV	V
B. fuscicornis (Jur.) . .	♀. Mid	0	0	15	8	16
,, ,, . .	♀. Hind	0	8	22	5	4
,, ,, . .	♂. Mid	0	0	6	0	4
,, ,, . .	♂. Hind	0	4	4	2	0
B. cephalotes (Först.) .	♀. Mid	19	21	17	0	1
,, ,, .	♀. Hind	32	23	3	0	0
,, ,, .	♂. Mid	3	6	6	0	0
,, ,, .	♂. Hind	8	7	0	0	0

4. *The Wings.*

The wings vary considerably in colour in both species, being darker on the average in *B. cephalotes* (Först.).

Species	Hyaline	Slightly infuscate	Distal half brown	Entirely brown
B. fuscicornis (Jur.) ♀ . .	15	10	12	2
,, ,, ♂ . .	2	2	4	2
B. cephalotes (Först.) ♀ . .	9	28	14	7
,, ♂ . .	0	9	3	3

(*B*). *Variation in structure.*

In a preliminary study, body-length was measured to the nearest half millimetre with a ruler. Later, for more accurate study, the body-length was estimated by measuring the length of the hind tibia with a screw-eyepiece-micrometer. The total body-lengths are dealt with first.

Length in mm.	*B. fuscicornis* (Jur.)		*B. cephalotes* (Först.)	
	♀	♂	♀	♂
2·1–2·5	0	6	0	0
2·6–3·0	11	1	1	4
3·1–3·5	17	1	2	5
3·6–4·0	8	1	18	5
4·1–4·5	1	0	21	1
4·6–5·0	0	0	11	0
5·1–5·5	0	0	3	0
No. of specimens . .	37	9	56	15
Mean length . . .	3·28	2·74	4·28	3·53

The most important character separating *B. fuscicornis* (Jur.) and *B. cephalotes* (Först.) is the ratio between the distance separating the posterior ocelli to the distance separating one of the posterior ocelli from the occiput. This ratio was estimated by eye and tabulated in a number of specimens; it varies from 1·6–2·66 in *B. fuscicornis* (Jur.) ♀ and from 0·4 to 0·8 in *B. cephalotes* (Först.) ♀; the limits in the respective males are 2·0–2·5 and 0·6–1·0. In the females, the magnitude of this ratio shows no relation to body-size in *B. fuscicornis* (Jur.), but a distinct relationship in *B. cephalotes* (Först.), as the following figures show :—

Size class in mm. .	2·6–3·0	3·1–3·5	3·6–4·0	4·1—4·5	4·6–5·0	5·1–5·5
Frequency . . .	1	2	18	21	11	3
Mean value of ratio .	0·66	0·60	0·59	0·54	0·49	0·50

I have calculated from these figures the correlation coefficient between body-length and the value of the ratio. It comes to $-0{\cdot}3811$ ($P < 0{\cdot}01$). Thus, the smaller specimens of *B. cephalotes* (Först.) approach more closely to *B. fuscicornis* (Jur.) in this important specific character, though there was no overlap in any of the specimens examined.

Classes of hind tibia length mm.	*B. fuscicornis* (Jur.)						*B. cephalotes* (Först.)					
	♀♀			♂♂			♀♀			♂♂		
	Frequency	Relative wing-length		Frequency	Relative wing-length		Frequency	Relative wing-length		Frequency	Relative wing-length	
		Mean	Extremes		Mean	Extremes		Mean	Extremes		Mean	Extremes
0·379–0·427	1			5	3·484	2·82–4·33						
0·433–0·481	6	3·310	0·47–4·30	9	3·516	2·86–4·11				2		
0·487–0·535	14	3·295	2·53–4·91	5	3·474	2·73–4·07				7	4·202	3·77–4·84
0·541–0·589	18	2·954	0·79–4·44	3	2·830	2·78–2·91	4	4·057	3·51–4·70	5	3·896	3·53–4·30
0·595–0·643	20	3·419	2·61–4·18	1	2·830	—	4	3·880	3·56–4·03	10	3·643	3·14–4·01
0·649–0·697	6	3·097	2·57–3·77				16	3·791	3·34–4·15	3	3·760	3·69–3·82
0·703–0·751	3						30	3·830	2·98–4·45	1		
0·757–0·805							24	3·658	2·94–4·17			
0·811–0·859							19	3·475	2·77–3·84			
0·876							1					

Another ratio of some importance as a specific character, is that between the distance between the posterior ocelli (divisor) and between one of the posterior ocelli and the median ocellus (numerator). This varies as follows :—

Species	Size of ratio			
	1	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$
B. fuscicornis (Jur.) ♀ . .	35	1	3	0
,, ,, ♂ . .	10	0	0	0
B. cephalotes (Först.) ♀. .	3	11	43	1
,, ,, ♂ .	7	5	3	0

In studying the variation in wing-length, it is necessary to make an allowance for the absolute size of the individual. This allowance is made by dividing the wing-length by the length of the hind tibiae, the ratio so obtained being referred to as the relative wing-length. The table opposite gives the frequency of specimens of different sizes (*i.e.* length of hind tibia) and the mean and extreme values of the relative wing-length in each size-class.

The first inspection of the table reveals that the relation between size and relative wing-length is very irregular in *B. fuscicornis* (Jur.), but that there is a fairly regular reduction of relative wing-length in relation to size in *B. cephalotes* (Först.). In the latter species, the correlation coefficient between these two features has been calculated; it is $-0{\cdot}4049$ ($P < 0{\cdot}01$) for the females, and $< 0{\cdot}4739$ (P between 0·02 and 0·01) for the males. As far as the relatively small number of dated specimens goes, there seems to be no relation in either species between relative wing-length and date of capture.

The great irregularity of the relation between wing-length and length of the mid tibia in *B. fuscicornis* (Jur.) is probably due to the nature of the variation in wing-length in this species. The following table of frequencies of relative wing-lengths shows that this character is bimodal (possibly tri- or quadrimodal) in *B. fuscicornis* (Jur.) but unimodal in *B. cephalotes* (Först.).

Class of relative wing-length	*B. fuscicornis* (Jur.). Frequency		*B. cephalotes* (Först.). Frequency	
	♀	♂	♀	♂
0·47 . . .	1	0	0	0
0·50–0·99 . .	0	0	0	0
1·00–1·49 . .	0	0	0	0
1·50–1·99 . .	4	0	0	0
2·00–2·49 . .	0	0	0	0
2·50–2·74 . .	9	1	0	0
2·75–2·99 . .	12	6	4	0
3·00–3·24 . .	5	4	6	2
3·25–3·49 . .	8	3	10	1
3·50–3·74 . .	9	2	30	6
3·75–3·99 . .	9	4	30	10
4·00–4·24 . .	6	2	13	3
4·25–4·49 . .	3	1	3	5
4·50–4·74 . .	0	0	1	0
4·75–4·99 . .	1	0	0	1

Class of hind tibia length in mm.	*B. fuscicornis* (Jur.) ♀♀				*B. cephalotes* (Först.) ♀♀			
	Frequency	Mean relative head-length	Mean relative head-width	Mean head-length/ head-width	Frequency	Mean relative head-length	Mean relative head-width	Mean head-length/ head-width
0·379–0·427	3	1·303	1·337	0·967				
0·433–0·481	4	1·307	1·380	0·948				
0·487–0·535	20	1·297	1·345	0·970				
0·541–0·589	24	1·271	1·280	0·976				
0·595–0·643	7	1·216 (1·13–1·29)	1·227 (1·11–1·29)	0·990 (0·971–1·022)	4	1·243 (1·19–1·30)	1·280 (1·18–1·39)	0·971 (0·917–1·016)
0·649–0·697	4	1·253 (1·11–1·38)	1·235 (1·11–1·36)	0·995 (0·936–1·025)	9	1·319 (1·21–1·39)	1·359 (1·28–1·43)	0·972 (0·913–1·006)
0·703–0·751					15	1·355	1·306	1·040
0·757–0·805					9	1·349	1·289	1·045
0·811–0·859					8	1·330	1·250	1·060
0·864–0·913					3	1·226	1·200	1·017

Two of the continental specimens of *B. fuscicornis* (Jur.) (♀ Aitolahti, ♀ Nora, nr. Stockholm) fall in the class 1·00–1·49. Moreover a ♂, no locality (*de Gaulle*) (P.) has wings reaching only to the end of tergite 1. The male specimen described as *B. berlandi* Arlé (p. 309) has still shorter wings. The only data bearing on the genetics of this character is one set of females which I reared (see below). The mother had a relative wing-length of 2·82, and her four female offspring had relative wing-lengths, 2·77, 2·67, 2·66 and 2·60.

Two other characters were measured in a certain number of female specimens, viz., the length of the head (from occiput to upper limit of antennal sockets) and the width of the head across the eyes. In the table opposite they are expressed as relative measurements (*i.e.* divided by the length of the hind tibia) and proportion between head-length and head-width is also given. The upper and lower limits of the ratios are given for those specimens of the two species which overlap in size. Thus in both species the head tends to be longer compared with its width in larger specimens, but this is more marked in *B. cephalotes* (Först.) than in *B. fuscicornis* (Jur.). With increase in body-size (estimated by hind tibia length), the relative head-length is nearly regularly reduced in *B. fuscicornis* (Jur.), but this relation is irregular in *B. cephalotes* (Först.); the relative head-widths are fairly regularly reduced in both species, though in all cases the smallest and largest specimens tend to be exceptional. There is little difference between the two species in the region where they overlap in size.

The following records of the habits of *B. fuscicornis* (Jur.) have been made.

Haliday (1834 : 219) on 5.vi., on the sandhills near Dublin, found a female attacking a Tineid larva much larger than herself. The prey was seized in the wasp's mouth and she attempted to carry it up the sand. As she did not succeed, a piece of straw was placed near her and up this she rushed backwards. When she had climbed about two feet up a sandbank, she found a projecting, hollow piece of " reed." She wedged the larva in near its base, explored the bank all round, then ran down and entered the reed. Coming out again, she fetched her prey, dragged it along a little, then left it and re-entered the reed. Finally, she dragged it in head foremost. Ferton (1901 : 144, as *B. triareolatus*) found this species at Evisa, Corsica, on 5.vii., inside a bramble-stem. With it were four green larvae devouring a green caterpillar, of which scarcely anything but the skin was left. These larvae were kept, but were not re-examined until 17.x., when a male and female of the wasp were found dead, with their cocoons. The other two larvae had dried up. The association of the female with her larvae, already noted in *Cephalonomia* (p. 302), is known in other Bethylids (e.g. *Epyris*) and seems to be rather characteristic of the group. It is perhaps especially significant if they are regarded as descended from the ancestral stock which gave rise to the ants.

Richards (1932 : 36, as *B. cephalotes*) observed a female attacking a caterpillar in a meadow at Slough, Bucks, 9.iv.1930. The wasp was hanging on to the head of a 10 mm.-long (two and a half times as long as the wasp) Noctuid larva which was probably being stung, judging by its struggles. The pair were kept indoors in a watch-glass, with a little damp sand. The caterpillar soon became inert, though capable of slight movements and able to grip with its false legs. The wasp malaxated the base of the thoracic legs and the mouth-parts, but not so vigorously as to break the skin. The caterpillar was now seized by its maxillae and dragged about, the wasp walking backwards, probably searching for a suitable nesting-site. Later, the hind half of the prey wriggled violently, and the wasp went along malaxating the side of each segment.

On 11.iv., six eggs had been laid, on one side of the first five abdominal segments (the first having two). The eggs were semi-transparent, slightly curved, 1·5 mm. long. They lay with the concave side against the prey. The eggs hatched on 16.iv. and it was later found that the head of each larva (except the extra one on the first segment) was attached to the posterior margin of the host-segment. The host was still able to react violently when touched. The larvae were full grown on 27.iv. and were attempting to spin cocoons, but were not successful, perhaps because they were not enclosed in a narrow enough space. Pupae began to be formed on 30.iv., were fully formed on 6.v., and the adults emerged on 19.v. The four that were preserved were females. A short description of the larva was also given.

Further records are those of Giraud (*in* Kieffer, 1905 : 238) who bred it from bramble-stems at Nice, and Fitch who bred it from the galls of *Biorrhiza aptera* (Ol.) (Kieffer, 1905 : 237). Butterfield and Fordham (1930 : 369) record that it has also been bred from oak-apples in Notts. In the British Museum collection is a male labelled "Hunstanton, Norfolk, 8.vii.1918, in case of *Coleophora* (*G. T. Lyle*)." In Mr. C. Morley's collection is a female labelled "Littlehampton, 26.vi.1889, bred from *Gelechia* (*Aristotelia*) *brizella* Tr. on thrift (*Armeria maritima*) (*N. M. Richardson*)."

As regards time of occurrence, it appears that the females of both *B. fuscicornis* (Jur.) and *B. cephalotes* (Först.) occur throughout the year, hibernating

	Month of capture of *Bethylus*											
	i.	ii.	iii.	iv.	v.	vi.	vii.	viii.	ix.	x.	xi.	xii.
B. cephalotes (Först.) ♀	1	7	3	13	14	22	29	36	10	0	0	1
,, ♂	0	0	0	0	1	1	11	14	6	2	0	0
B. fuscicornis (Jur.) ♀	1	1	3	2	7	20	23	26	13	2	1	0
,, ♂	0	0	0	0	0	5	14	7	6	2	0	0

in grass-tufts, etc. The males are found from May to October. There are probably at least two and perhaps more generations a year.

Bethylus dendrophilus sp. n.

♀. Closely resembles *B. fuscicornis* (Jur.) but differs as follows: mandibles dark; mid and hind tibiae darker; wings hyaline. Length 2·3–3·0 mm.

Head narrower, sculpture finer, surface therefore rather more shining, hairs longer and more numerous but punctures very fine; eyes a little longer than distance separating them from occiput; clypeus less transverse, margin more produced owing to much stronger keel between antennae; antennae shorter, segment 1 only twice as long as broad, 2 hardly twice as long as broad, remainder one and a half times or less; ocelli all of same size, posterior pair distinctly farther apart than the distance from median ocellus to one of them, separated by their diameter or less from actual hind margin of head. Thorax more shining, more finely sculptured. Claws apparently without the truncate tooth. Wings fully as long as abdomen.

Type ♀ Berks, Windsor Forest, 11.v.1927 (*H. St. J. Donisthorpe*) (in British Museum collection). *Paratypes*: Surrey, Oxshott, ♀ (*K. G. Blair*) (Bl.);

Suffolk East, nr. Ipswich,[27] ♀, 25.vi.1935 (*R. S. Macdonogh*) (coll. O.W.R.); Kent East, nr. Benenden, on ground, ♀, 9.iv.1939 (*O.W.R.*); France, no data, ♀ (coll. L. Fairmaire) (P.), Val Verrières (? nr. Paris), genevrière (juniper), ♀, 15.iv.1877 (coll. L. Fairmaire) (P.). A series of 2 ♂♂ and 6 ♀♀ from France in Mr. C. Morley's collection almost certainly belongs to this species. The females differ from the English specimens only in having the head a little more shining and less punctured, the shining area of the propodeum broader behind and spreading more over the posterior surface, and the antennae paler.

The following is a description of the males :—

♂. Black; mandibles, antennae, fore tibiae, mid tibiae proximally, hind tibiae proximally and distally, all tarsi, yellowish. Length 1·75 mm.

Structurally (including 8th sternite and apparently also genitalia) like *B. fuscicornis* (Jur.), except in the points in which the type female differs in head, antennae and thorax.

Mr. Morley's specimens were labelled as follows : " Parasites of *Stagmatophora grabowiella* Stgr., Ste. Maxime (east of Hyères), April '07, emerged May '07. Larva makes a case of its excreta on its food-plant (*Lavendula*); moths reared at *same time*—fossor could only occupy the *empty* cases. T.A.C. [Chapman] 31 October '17. The *Bethylus* was *certainly* parasitic and not fossorial; in the latter case it would emerge much (? whole year) later; they emerged at *same* time as the moths. T.A.C. 6th November '17."

Certain other reputed species of Bethylus.

Bethylus hyalinus (Marshall).

Perisemus hyalinus Marshall, 1874 : 133.

Original description: " P. niger, nitidus, antennis medio, tibiis anticis, tarsisque omnibus, testaceis; capite et thorace alutaceis, vage punctulatis, subopacis; metathorace supra areola triangulari; alis clari hyalinis, stigmate et radio fuscis, nervo basali angulato, extus ramifero; abdomine levissimo. ♀ Long. 1⅓ lin. Equal in size to the smaller individuals of *triareolatus* [= *B. fuscicornis* (Jur.) + *B. cephalotes* (Först.)], which it much resembles, but differs from it (1) in having hyaline wings and (2) in the structure of the metathorax. This is bisected by a carina originating at the base of the petiole, and forked at three-fourths of its length, so as to enclose a smooth triangular space which rises slightly to meet the scutellum and is emarginated to receive its apex, the two appearing almost soldered together. The common species is without this structure, having merely a glabrous line from the scutellum to about the middle of the metathorax. The upper half of the metathorax is aciculated and obscure in both species, except in the glabrous spaces above indicated. There is one more described species, *Episemus* (read *Perisemus*) *nitidus* Thoms. *Ofv.* 1861, p. 452, but this is characterised as ' capite non alutaco,' etc. Taken near St. Albans June 1873."

The type of *P. hyalinus* seems to be lost, but I cannot help feeling that if the specimen was not a structural freak there has probably been some error in description. It is best, for the present, to omit the species from the British List.

[27] Mr. Macdonogh made a collection of the cases of the Psychid moth *Luffia ferchaultella* (Steph.), nr. Ipswich, 25.vi.1935. These were placed in a cage together with a log from Slough, Bucks. The wasp was noted on 7.vii.1935. It is probable that it emerged from one of the Pyschid cases, but it might have been in a cocoon attached to the log.

Bethylus mandibularis Kieffer, 1904a.

In an earlier paper (1935 : 157), I reported that the type of this species was in the British Museum. This is incorrect; the specimen from the Cameron collection, though marked as type, is merely a specimen identified by Kieffer. The real type, described from Italy (Island of Giglio), is probably in the museum at Genoa. In default of re-examination of the type, it is best to regard *B. mandibularis* Kieff. as a synonym of *B. fuscicornis* (Jur.). The description agrees with the male of that species; it is possible, however, that it is the same as the French specimens which I have referred to *B. dendrophilus* sp. n.

Bethylus apteryx Kieffer, 1905.

The description of this species, recorded from Hungary, might well apply to a form of *B. fuscicornis* (Jur.) in which the wings and tegulae were completely absent. In view of the great variation in wing-length in that species, such an extreme variety might well be expected to occur. Hellén (1920) records *B. apteryx* Kieff. from Finland.

Bethylus fulvicornis auctt.

As already stated (p. 309), *B. fulvicornis* Curtis was founded on the males of *B. fuscicornis* (Jur.). Hellén (1920 : 279) distinguished between what he calls *B. fulvicornis* and *B. fuscicornis* (Jur.), as follows: Head hardly visibly hairy, with few (about 30) weakly impressed punctures. Fore femora red—*fulvicornis*. Head distinctly hairy, with many (about 100) distinct punctures. Fore femora black—*fuscicornis* (Jur.) (= *variabilis* (Thoms.)).

These characters cannot be successfully used to distinguish two species amongst British material. Hellén is probably right in regarding *Episemus variabilis* Thomson, 1862, as a synonym of *B. fuscicornis* (Jur.). Bernard (1935 : 51) also records females of what he terms *B. fulvicornis* Curt., from S. France. If his specimens were not my *B. dendrophilus* they were probably only light-coloured forms of *B. fuscicornis* (Jur.).

Bethylus formicarius (Panzer).

Ceraphron formicarius Panzer, 1806.

This, like *Bethylus punctatus* Latreille, 1804, was probably based on a mixture of *B. fuscicornis* (Jur.) and *B. cephalotes* (Först.). Latreille's type is lost and it is best to ignore his name; unless Panzer's type can be recovered, his name, too, is best disregarded.

Bethylus nitidus (Thomson).

Episemus nitidus Thomson, 1862.

Thomson described a species with a shining head but with no keel between the antennae. If indeed the inter-antennal keel of this species is really absent, it is very doubtful if it can belong to the genus *Bethylus* Latr. I have seen three specimens of *Bethylus* with shining heads; one Rumania, Comana Vlasca, ♂ (*A. C. Montandon*) (M.) is very close to *B. fuscicornis* (Jur.); the position of the ocelli is similar, but the head is shining, very weakly alutaceous, very sparsely punctured, and the antennal sockets are closer together. Another specimen, France, Lozère, Mende, ♀, 10.viii.1927 (*O.W.R.*), resembles *B. cephalotes* (Först.),

but the head is shining, with sparse fine punctures, not alutaceous. Finally, the third, Oran, Geryville, ♀ (*E. André*) (P.), is similar to the last, but the head is feebly alutaceous. More material will be required to determine the status of these forms.

Bethylus gaullei Kieffer, 1905 : 279.

This species is represented in the Paris Museum by 4 ♀♀, Tanger (*de Gaulle*), all marked as type. The abdomen can hardly be called brown, as Kieffer says in his description. The position of the ocelli is almost intermediate between *B. fuscicornis* (Jur.) and *B. cephalotes* (Först), though more like the former,

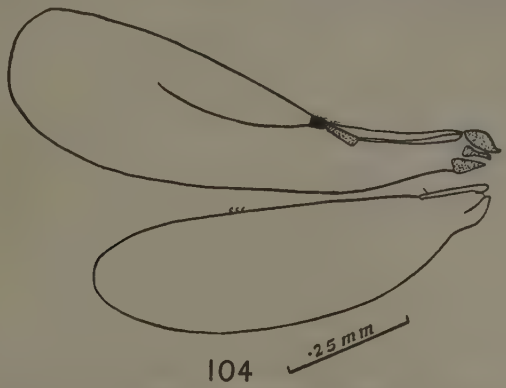


Fig. 104.—Left wings of *Plastanoxus westwoodi* (Kieff.) ♀.

of which it may be an extreme variety. The head and thorax are rather more shining than in *B. fuscicornis* (Jur.) and the size is large. Length 5·0 mm.

Plastanoxus Kieffer, 1905.

Very small black insects with the legs and antennae partly or entirely pale. Fore-wings (fig. 104) with a pterostigma emitting a moderately curved radial vein, end of Sc + R + M strongly thickened; other veins hyaline but cells defined by Cu1 + 1A and by 2A traceable; hind-wings with no anal vein, only a single distinct vein (Sc + R + M) bearing one straight proximal hamulus, distally apparently with three curved hamuli. Antennae with twelve segments. Eyes usually hairy, rather small, especially in female. Ocelli present. Occiput not margined. Mesonotum with no notaulices but with traces of parapsidal furrows; scutellum and mesonotum separated by a narrow impressed line and two small depressions. Mesopleuron with a dorsal fovea but apparently without furrows. Tibiae not spiny. Propodeum with dorsal surface defined by keels. Abdominal segments without posterior depressions.

Genotype (fixed by Gahan, 1931) = *Anoxus chittendenii* Ashmead, 1893.

The type species of the genus was found in fungi with *Cis fuscipes* Mell., on which it is presumably parasitic. The two British species have both been found in warehouses and granaries. In America, *P. westwoodi* (Kieff.) has been bred from *Laemophloeus pusillus* Schönh. (Gahan, 1931). It is probable that species of this genus are the hosts in England.

The genus is recorded from Europe and U.S.A., while the new species described in the present paper may be of African origin.

Plastanoxus westwoodi (Kieffer).

Cephalonomia westwoodi Kieffer, 1914.
Plastanoxus westwoodi Gahan, 1931.

♀. Black; greater part of fore tibiae, narrow distal portion of mid and hind tibiae, all tarsi, most of antennal segment 2, testaceous to yellowish; wings hyaline, venation pale brown. Length 1·0–1·5 mm.

Head shining with no perceptible sculpture, rectangular, nearly twice as long as broad, broadest just behind front margin of eyes, sides very little converging either in front or behind; sides of head in front of eyes about one-quarter as long as eyes, sides of head behind eyes about one and a half times as long as eyes; antennae if laid back extending to posterior margin of pronotum, segment 1 a little curved and clavate, two and a half times as long as broad, as long as 2 + 3 + 4, 2 pyriform, a little longer than broad, 3–11 becoming progressively a little longer and thicker, 3 a little transverse, 11 quadrate, and 12 one and a half times as long as broad, shorter than 10 + 11; eyes apparently bare; ocelli small, placed in slight pits, arranged in an equilateral triangle, posterior ocelli separated from occiput by less than their diameter, median ocellus placed about twice as far behind line through posterior margin of eyes as distance between median and lateral ocellus. Lengths of pronotum, mesonotum and scutellum as 10 : 3 : 4; these parts shining and unsculptured; mesonotum with no notaulices but with traces of parapsidal furrows; scutellum in front with two weak, widely separated impressions; propodeum with dorsal surface defined laterally and posteriorly by fine keels, one and a third times as long as broad, twice as long as scutellum, finely shagreened anteriorly with traces of a fine central keel, almost posterior half smooth and shining. Fore-wings with the open radial cell about three times as long as broad, distal end of radius not much over half-way from pterostigma to wing-tip. Abdomen shining, unpunctured, segments 3–6 very faintly reticulate.

♂. Similar to ♀ except in the following particulars: mandibles brown; head much more rounded, one and a half times as long as broad, sides moderately converging behind and considerably so in front; sides of head in front of eyes half as long as eyes; antennae if laid back extending to posterior margin of mesonotum, segment 1 curved and clavate, two and a half times as long as broad, a little longer than 2 + 3, 2 pyriform, one and a half times as long as broad, 3 quadrate, 4–11 of about the same length as one another, hardly longer than broad, 12 longer than 10 + 11, more than twice as long as broad; median ocellus only a little further behind a line drawn through posterior margin of eyes than distance between median and lateral ocellus. Lengths of pronotum, mesonotum and scutellum as 10 : 5 : 6.

Specimens examined: ♂♀ (det. A. B. Gahan) No. 9. Report Grain Pests Committee, 1931 (B.M.) (= grain from Sydney received at Plymouth, *see* Durrant, 1921 : 218); Berks, Sonning, in wheat refuse in old mill, ♂, 3 ♀♀, x.1929 (*cf.* Richards, 1933 : 52); London, in sample of Accra cacao, in the same bean as an empty *Ephestia* pupae, ♀, 22.x.1930 (*F. Passmore*).

Plastanoxus munroi sp. n.

♂. Black, fore tibiae mainly, mid and hind tibiae with narrow proximal and distal extremities and all tarsi, testaceous; mandibles brownish; wings hyaline, venation pale brown. Length about 1·75 mm.

Head moderately shining with a faint reticulation, subcircular, a little broader than long, broadest across middle of eyes; sides of head in front of eyes half as long as eyes,

sides of head behind the eyes two-thirds as long as eyes; antennae if laid back extending to the posterior margin of the scutellum, segment 1 a little curved, more than three times as long as broad, considerably longer than 3, 3–11 all of about the same length and thickness, one and a third times as long as broad, 12 two and a half times as long as broad, shorter than 10 + 11; eyes bare; ocelli in an equilateral triangle, posterior ocelli separated by nearly twice their diameter from occiput, median ocellus placed on line drawn through posterior margin of eyes. Lengths of pronotum, mesonotum and scutellum as 10 : 4 : 7; these parts dull, finely shagreened; mesonotum with no notaulices but with traces of the parapsidal furrows; scutellum in front with two subcircular impressions separated by more than twice the diameter of one of them; propodeum with dorsal surface defined laterally and posteriorly by distinct keels, one and a quarter times as long as broad, not quite twice as long as scutellum, dull, coarsely shagreened throughout. Fore-wings with costal and median cells distinct (Sc + R + M brown, Cu subhyaline), the open radial cell three times as long as broad. Abdomen missing.

Type ♂ London, Wapping, in warehouse in sample of Gold Coast cacao, 1.x.1926 (*O. W. Richards* and *W. S. Thomson*). Type in the collection of the British Museum.

I have also examined a female (unfortunately headless) captured at the same time and place; in the sculpture of the thorax it exactly resembles the male. I have named the species after Prof. J. W. Munro, under whose direction the study of Stored Products insects at the Imperial College of Science was initiated and has successfully proceeded. Besides *P. westwoodi* (Kieff.), there are only two other certain species of *Plastanoxus*, *P. laevis* (Ashmead) and *P. chittendeni* (Ashmead). Both these are out-of-door species; *P. laevis* has a median propodeal keel and *P. chittendeni* has no defined median cell and the eyes are almost as close to the occiput as to the mandibles. *P. munroi* is close to *P. westwoodi* but differs sharply in sculpture and (in the male) in the shape of the head. It will probably prove to be another parasite of beetles in stored products.

Epyris Westwood, 1832.

Rather small black insects with legs only pale to a small extent. Fore-wings (*cf.* fig. 105) with a pterostigma emitting a moderately curved radial vein, end of Sc + R + M and base of M not thickened, cells Sc + R + M and Cu1 + 1A distinct, of equal length; hind-wings with a short anal vein, and with one straight proximal and four curved distal hamuli. Mandibles with one strong ventral and three minute dorsal teeth. Antennae with 13 segments. Eyes bare or hairy, of moderate size, placed far forwards. Ocelli present. Occiput margined. Mesonotum very short, with parapsidal furrows and notaulices distinct; scutellum and mesonotum separated by well-marked depressions. Mesopleuron with a strong postero-dorsal circular impression, ventrally with a furrow defined by a weak keel from just in front of mid coxae up to a point a little below the prothoracic spiracle. Mid tibiae sometimes spinose in female. Propodeum with dorsal surface defined by keels. Abdominal tergites without posterior depressions. Male genitalia essentially of the same type as in *Pseudisobrachium* Kieff. (fig. 111) though differing in details.

Genotype (genus monobasic) = *Epyris niger* Westwood, 1832. The genus is found in all the main regions of the world. Nothing seems to be known of the habits of the European species of *Epyris*; the two British species are extremely rare. It is probable, however, that, like the exotic species, they are beetle parasites. *E. fraternus* Westw. looks as if it penetrated the earth in search of its prey. Williams (1918) has given an interesting account of *Epyris extraneus*

Bridwell which attacks the larvae of *Gonocephalum seriatum* (Blanchard) (TENEBRIONIDAE) in Hawaii. The female, which is about 6·0 mm. long, attacks the beetle larvae when they are 13·5–16·0 mm. long and seizes them by the head and stings them under the thorax. When they are immobile, she drags them to some temporary hiding-place and looks for a nesting-site. Here, a hole is dug and the paralysed prey is buried and a single egg is laid on it. The *Epyris* larva eats up the beetle grub and spins a tough cocoon. The habits of this species are therefore exactly like those of a Sphecid or Pompilid.

Epyris niger Westwood, 1832.

♂. Black, mandibles pitchy; articulations of all femora to tibiae, four front tibiae, all tarsi, tegulae, light brown. Wings hyaline, venation dark brown. Length 3·0–4·0 mm.

Head subquadrate, but posterior angles completely rounded, a little broader than thorax, surface dull and densely alutaceous, with fine, sparse punctures just visible amongst the other sculpture, covered with rather numerous, long hairs; eyes oval, shortly hairy, almost meeting mandibles in front, separated by rather more than their length from occiput; clypeus small, longitudinally convex; a slight longitudinal impression between antennal sockets, which are a little nearer to one another than outer edge of one of them is to eyes; antennae with very short pubescence, if laid back, extending nearly to posterior margin of propodeum, segment 1 rather strongly curved, about two and a half times as long as broad, as long as or rather shorter than 2 + 3, 2 a little longer than broad, 3 about one and a half times as long as broad, 4 and 5 twice as long as broad, 6–9 as long or a little longer, 10–12 becoming a little shorter again, 13 about two and a half times as long as broad; ocelli in a small equilateral triangle, lateral ones separated from occiput by distance equal to POL. Pronotum a little narrower in front (where it is rounded) than behind, sinking in regular curve to anterior collar, not quite as long as its posterior width, about one and a half times as long as mesonotum, dull, densely alutaceous, with scattered short hairs and a few fine punctures at sides posteriorly, lateral aspect with a moderate vertical impression crossed by a few very weak striae; mesonotum quite smooth and shining in front, becoming alutaceous and a little dull behind, parapsidal furrows parallel, notaulices also parallel, strongly narrowed in front, posteriorly broadening and deepening, ending just in front of scutellum, crossing two-thirds length of mesonotum; scutellum flat, weakly alutaceous, a little shining, with a few punctures, posteriorly overlapping and hiding the centre of the metanotum ("postscutellum"), anterior depressions very transverse, almost meeting; mesopleuron dull, alutaceous, posterior margin (adjacent to metapleuron) impressed and weakly crenate; metapleuron shining, nearly smooth; propodeum with dorsal surface quadrate, margined at sides and posteriorly (latter margin somewhat undulate), with a complete central keel on each side of which is a keel (not quite complete behind) converging a little towards it soon after leaving metanotum, lying one-third of way between central keel and margin, just inside each marginal keel (separated from it by about diameter of mid tibia) is another keel proceeding from the posterior margin and converging to meet lateral margin in front, surface between keels moderately shining, with regular transverse rugosities, except quite anteriorly where a few are longitudinal, posterior surface subtriangular, rather dull, transversely rugose with a fine central keel, lateral surfaces moderately shining, with coarse-meshed shagreening and a few striae above. Legs moderately stout, pubescent but without spines on tibiae, fore basitarsus strongly curved proximally, fore tarsal segments 2–3 cylindrical, 4 weakly cordiform, tarsi all a little longer than their tibiae. Fore-wings with pterostigma separated from proximal part of costa by a hyaline spot, stigma beyond spot about two and a half times as long as broad, distally rounded-truncate, costa produced as a weak vein as far beyond stigma as length of latter, radius curved proximally, becoming nearly straight, the distally open radial cell being

three and a half times as long as broad, wings extending about to end of abdomen. Abdomen subpetiolate, shining, with sparse pubescence.

♀. Resembles male except in the following particulars: Mandibles pitchy to yellow-brown; antennal sockets and segment 1 distally, pitchy; four front tibiae dark except proximally. Length 3·5–4·5 mm.

Head distinctly longer than broad; punctures more numerous and more easily seen, shallow, separated by 2–4 diameters; antennae shorter, if laid back extending to posterior margin of mesonotum, segment 1 thick and curved four times as long as broad, as long as 2 + 3 + 4; 2 one and a half times as long as broad, 3–8 becoming gradually a little thicker, 9–12 becoming slightly thinner again, all about quadrate, 13 a little shorter than 11 + 12. Pronotum twice as long as mesonotum, punctures evenly spread over its whole surface on top of dense alutaceous sculpture; mesonotum more than twice as wide as long, dull, densely alutaceous, with a few indistinct punctures, notaulices converging posteriorly dividing mesonotum into three nearly equal parts, each furrow broadening and deepening behind, ending just in front of scutellum, crossing two-thirds length of mesonotum; scutellum dull alutaceous, with rather close punctures at sides, none down centre; metapleuron duller; propodeum with keels of dorsal surface all complete; rugosities between keels all transverse; posterior surface finely alutaceous, becoming a little shining in centre. Legs like male but stouter, mid femora two and a half times as long as greatest width, segments 2–3 of front tarsi cylindrical, 4 weakly cordiform. Wings similar but extending to about end of third tergite, costa not produced beyond stigma.

Specimens examined: Type ♂ (Westwood coll.) (H.W.) (data according to Westwood (1832) Surrey, Ripley); Kent East, Huntingfield, ♂, viii.1904, ♂, 16.viii.1904, ♀, 31.viii.1903, ♀, 1.ix.1905, Doddington, ♀, 2.vi.1901, Whitstable, ♀, 31.iii.1906, (*A. J. Chitty*) (M.), Appledore, ♀, 3.ix.1901 (*A. Beaumont*) (M.); Hants South, Gosport, ♀, 8.ii.1908 (*C. J. C. Pool*) (H.); Is. of Wight, Compton Bay, ♂, 6.ix.1936 (K. G. Blair) (B.M.); Devon South, Heathfield, ♀, 8.viii.1929, (*G. E. J. Nixon*), Bovisand, ♂, viii.1905 (M.); ? vice-county, Tolehurst, ♀ (*A. J. Chitty*) (M.); no locality, ♀ (H. W.), ♀ (F.). I have also examined two females from France: ♀ (F.), Saclas, ♀, viii.1927 (*H. Audcent*) (M.).

Evidently the female hibernates, as in *Bethylus*. The description of the species by Kieffer (1914) agrees with Westwood's type which also runs down to *E. niger* in Kieffer's key.

Epyris fraternus Westwood, 1874 : 157.

Epyris saevus Westwood, 1874 : 158.
E. multidentatus Kieffer, 1906 : 333. **syn. n.**

♂. Black; mandibles, legs, tegulae and antennae more or less brown; trochanters, all tibiae proximally and distally, and whole of tarsi, paler brown; wings hyaline or very faintly brown-tinged. Length 3·0 mm.

Head subquadrate, posterior angles rounded-rectangular, little broader than thorax, surface moderately shining, very finely and microscopically alutaceous, with numerous fine punctures (especially at sides posteriorly) separated by 3–4 diameters, with fairly numerous short hairs; eyes oval, shortly hairy, almost meeting mandibles in front, separated by one and a half times their length from occiput; clypeus somewhat longitudinally convex, margin produced into a subangular lobe; no depression between antennae, inner edge of sockets only a little closer together than outer edge of one of them is from eye; antennae with very short pubescence, if laid back, extending beyond brow of propodeum, segment 1 strongly curved, about two and a half times longer than broad, about as long as 4, shorter than 2 + 3, 2 and 3 one and a third times as long as broad, 4–12 subequal, two and a half times as long as broad, 13 three times as long as broad; ocelli in a small equilateral triangle,

posterior ones separated from occiput by distance equal to POL. Pronotum only a little narrowed in front (where it is rounded), sinking in a regular curve to anterior collar, not quite as long as its posterior width, nearly twice as long as mesonotum, surface moderately shining, very microscopically alutaceous, with fine but quite numerous punctures (separated 4–5 diameters) and scattered short hairs; lateral aspect with a rather deep vertical impression, crossed below by a few striae; mesonotum moderately shining, finely alutaceous, unpunctured, two and a half times as broad as long, notaulices broadening and deepening posteriorly, parallel, ending opposite scutellar depressions (from which they are separated only by a linear keel), crossing four-fifths of length of mesonotum; scutellum flat, shining, unpunctured, weakly alutaceous, posteriorly overlapping and hiding centre of metanotum ("postscutellum"), depressions circular, separated by three times their diameter; mesopleuron moderately shining, weakly alutaceous, posterior margin (adjacent to metapleuron) impressed and weakly crenate; metapleuron shining, finely striate; propodeum with dorsal surface a little broader than long, weakly margined at sides and posteriorly (margin in places only visible from some points of view), with a complete central keel, on each side of which is a feeble or rudimentary keel (sometimes almost comparable with other rugosities) extending about one-third the length of surface, lying about one-third of way from central keel to margin, just inside margin is a deep, strongly crenate furrow, extending from posterior margin of surface almost to anterior margin, inner edge of furrow not raised into a keel, surface dull, on disc with irregular vermiculate rugosities, tending to be more longitudinal anteriorly, at sides rugosities weaker and more transverse, posterior surface subtriangular, rather dull, finely transversely rugose, with a fine central keel, lateral surfaces rather dull, finely and regularly longitudinally striate. Legs moderately stout, pubescent but without spines on tibiae, fore basitarsus strongly curved proximally, front tarsi with segments 2–3 cylindrical, 4 weakly cordiform, tarsi all a little longer than tibiae. Wings with all venation very pale brown; pterostigma separated from basal part of costa by a hyaline spot, stigma beyond spot two and a quarter times as long as broad, and truncate, costa weakly produced beyond stigma to distance not longer than stigma, radius curved proximally, becoming nearly straight, distally open radial cell three and a half times as long as broad, wings extending to about the end of abdomen. Abdomen subpetiolate, shining, with sparse pubescence, unpunctured.

♀. Resembles the male except in the following particulars: antennae, tibiae and tarsi often paler, reddish, wings distinctly darkened, especially beyond the pterostigma. Length 4·5–5·0 mm.

Head less alutaceous, more shining, punctures rather stronger, head nearly bare, eyes bare; clypeus more convex, margin apparently not produced; antennae if laid back extending to posterior margin of mesonotum, segment 1 strongly thickened and curved, three times as long as broad, as long as 2 + 3 + 4, segment 2 a little longer than broad, 3 a little shorter, quadrate, 4–12 equal in length, about one and a third times as long as broad, intermediate segments broader than the others, 13 two and a half times as long as broad, shorter than 11 + 12; posterior ocelli distinctly nearer occiput than length of POL. Pronotum nearly bare, as long as its posterior width, nearly three times as long as very short mesonotum, more shining, punctures sparse but very distinct; mesonotum three times as broad as long, notaulices similar, but also with punctiform parapsidal furrows; meso- and metapleuron more shining; propodeum with dorsal surface quadrate, lateral and posterior margins strong, with a complete central keel, on each side of which is another keel, slightly converging towards it posteriorly, situated between one-third and one-half of way from central keel to margin, and extending across two-thirds of length of surface, just inside margin is a deep, weakly crenate furrow, the inner edge of which is not raised into a keel, surface shining, area between central keel and two adjacent to it weakly clathrate with many of raised rugosities tending to be longitudinal or even arranged so as to form short, interrupted keels, area at sides with fine transverse rugosity. Legs stout, femora

greatly thickened, mid femora not twice as long as greatest width; segments 2–4 of fore tarsi weakly cordiform and emarginate distally; mid tibiae with distinct though rather weak spines, as well as pubescence. Wings similar, but darker, shorter (not extending beyond posterior margin of third abdominal segment), costa produced beyond pterostigma a very short distance, rather less than proximal width of stigma.

Specimens examined: Type ♀ Surrey, Coombe Wood, 16.vii.1835 (H.W.); Suffolk East, Lowestoft, 2 ♀♀, 1879 (*F. Smith*) (B.M.); Surrey, Coombe Wood, ♂, 31.vii.1835 (H.W.); Hants South, Mudford-on-Sea, ♀, vii.1902 (*A. J. Chitty*) (M.); Is. of Wight, ♀, 1871 (*Rothney*) (B.M.), ♀ (*F. Smith*) (B.M.); no data, 3 ♂♂ (H.W.) (under *E. niger*), ♂, 2 ♀♀ (1 ♀ possibly foreign) (B.M.), ♀ type of *E. saevus* Westwood (? foreign) (B.M.).

The specimen from Mudford-on-Sea has some hairs on the eyes; possibly these are easily rubbed off and are always present in fresh specimens.

E. multidentatus Kieffer, 1906 : 333, was described from the following localities: France, Maisons-Lafitte, en Mai (*de Gaulle*); Italy, Rome (*Magretti*). In the Paris Museum are four female specimens; one (*ex* spirit) Maisons-Lafitte, one Maisons-Lafitte, 24.v. (here chosen as lectotype), one Toulon (*Fairmaire*), one no locality (Sichel). All are *E. fraternus* Westwood.

E. gaullei Kieffer, 1906 : 331, is a distinct species; it was described from France, Maisons-Lafitte; Poissy, en Août (*de Gaulle*). In the Paris Museum are two females from coll. de Gaulle, one from Maisons Lafitte (here chosen as lectotype), the other from Poissy. The head has numerous punctures; the eyes are hairy. The keel down the posterior face of the propodeum is very distinct, with a crenate furrow on each side of it. The pro- and mesonotum and the scutellum are quite closely punctured and the scutellum has very distinct subcircular depressions separated by about three diameters. The head and thorax are moderately shining. The Poissy specimen belongs to the same species though the furrows on each side of the propodeal keel are less distinct.

E. longicollis Kieffer, 1906 : 330, is represented at the Paris Museum by the type female, Spain, Pozuelo de Calatrava (*André*). It is very close to *E. fraternus* Westw. but the head is less closely punctured.

E. maximus Berland, 1923 : 115, is also close to *E. fraternus* Westw., but the antennal segments are longer and the head is less closely punctured.

Epyris brevipennis Kieffer, 1906.

♀. Black; mandibles, antennal segments 1 beneath and whole of about 2–4, anterior pronotal collar, articulations in all legs, most of all tibiae, all tarsi pitchy red; tegulae brown. Wings hyaline. Length 3·0–5·0 mm.

Resembles *E. fraternus* Westw. except in the following particulars: head less alutaceous (sometimes hardly perceptibly so) with fewer punctures; eyes separated from occiput by a little less than their length. Mesonotum four times as broad as long, notaulices almost punctiform; lengths of pronotum : mesonotum : scutellum as 6 : 1 : 2; scutellar depressions smaller and further apart; propodeum with keels between central keel and margin very short, hardly one-quarter as long as central keel, surface sculpture finer and more quickly evanescent posteriorly. Wings with similar though considerably abbreviated venation, wing extending to about middle of tergite 1.

Specimens examined: Lectotype ♀ France, Dunkerque (*de Gaulle*) (P.), Hardelot, nr. Boulogne-sur-Mer, on fixed sand-dunes, 3 ♀♀, 7.vii.1938 (*J. Reid*).

Kieffer (1906 : 336) described this species from Dunkerque (*de Gaulle*), Mont-de-Marsan (*Perris*), Amiens (*Carpentier*), Angleterre (*Marshall*). Berland

(1928 : 113) chose the Dunkerque specimen as the lectotype and it is marked as such in the Paris Museum. It is so covered with gum and mould mixed that I could not satisfy myself whether it was really distinct from *E. fraternus* Westw. Fortunately, Mr. Reid obtained three females on the French coast very near to the type locality. These, though very like short-winged specimens of *E. fraternus* Westw., have shorter heads with the eyes nearer the occiput and slightly different sculpture. It is just possible that these differences are merely consequential upon brachyptery. I have seen no British specimens, Marshall's being lost.

Rhabdepyris Kieffer, 1904b.

Resembles *Epyris* Westwood, except in the following particulars: mandibles (in the British species) with one strong ventral and one weaker dorsal tooth; parapsidal furrows and notaulices present; scutellum separated from mesonotum by a deep groove, usually divided centrally; ventral furrow of mesopleuron less complete anteriorly; tibiae not spinose. Wings (fig. 105).

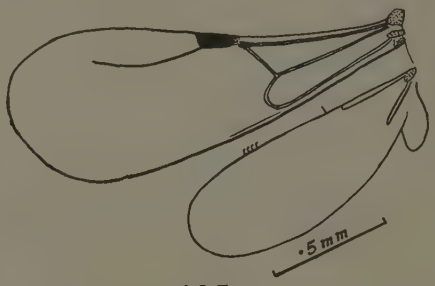


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Fig. 105.—Left wings of *Rhabdepyris zeae* Turner and Waterston ♀.

Genotype (fixed by Kieffer, 1906) = *Rhabdepyris myrmecophila* Kieffer, 1904b. The genus is found in all the main regions of the world. After 1904, Kieffer changed the gender of the genus to masculine. As *Epyris* itself is masculine, and the other compound genera such as *Holepyris* have always been treated as masculine, Kieffer's change has been followed.

Rhabdepyris zeae Turner and Waterston *in* Waterston, 1921.

♀. Black; mandibles, antennae, trochanters, tibiae, tarsi, and tegulae testaceous brown; centre of antennal segment 1, whole of 4–13, mandibles proximally, centre of mid and hind tibiae, darker. Wings hyaline, pterostigma and veins only a little darker. Pubescence pale, everywhere sparse. Length 3·0 mm.

Head subquadrate but sides considerably rounded, sides behind eyes a little convergent, posterior angles rounded, a little broader than mesonotum, surface shining, very weakly alutaceous, with sparse, rather fine punctures (separated by 4–5 diameters); eyes bare, long-oval, separated from mandibles in front by little more than width of second antennal segment, separated by two-thirds eye-length from occiput; clypeal region produced into a strong, transversely convex lobe, but not into a keel between antennae; antennal sockets set beneath slight tubercles, separated from one another by about half as much as they are from eyes; antennae with very short pubescence, if laid back reaching to posterior margin

of pronotum, segment 1 subcylindrical, a little curved and clavate, two and a half times as long as broad, longer than 2 + 3, shorter than 2 + 3 + 4, segment 2 much thinner, pyriform, twice as long as broad, 3 quadrate, 4–12 becoming gradually shorter and thicker, 4 one and a half times as long as broad, 12 about quadrate, 13 nearly twice as long as broad, a little longer than 11 + 12; ocelli in triangle with posterior side half as long again as two others, posterior ocelli separated by not more than their diameter from occiput, median ocellus far behind line drawn through hind margin of eyes. Pronotum about as long as broad behind, two and a half times as long as mesonotum, sides moderately convergent, rounded in front, where it sinks little and very gradually to the collar, posterior margin weakly emarginate, in lateral view with a broad smooth depression, dorsal surface sculptured like the head; mesonotum shining, unpunctured, hardly alutaceous, parapsidal furrows developed as isolated, sublateral, elongate pits, notaulices visible as elongate pits at posterior margin where a well-defined transverse groove marks off the scutellum; scutellum flat, shining; mesopleuron shining, almost unpunctured, dorsally with a slightly striate transverse furrow just below wings; metapleural suture weakly crenate; mesosternum flat, with a slight central furrow, depression for reception of fore coxae very slight, not defined; metanotum (" postscutellum ") almost completely covered by scutellum, at sides with very small pits; propodeum with dorsal surface hardly longer than broad, rectangular, defined laterally and posteriorly by distinct keels, with percurrent central keel and others, abbreviated behind, between it and sides, surface dull, coarsely shagreened; posterior surface flat, subtriangular, weakly shagreened; lateral surfaces dull, coarsely shagreened. Legs stout, front femora hardly four times as long as broad, tibiae without spines; tarsi cylindrical, claws toothed. Fore-wings with end of Sc + R + M not expanded, pterostigma truncate, nearly twice as long as broad, costa not produced beyond it, radius nearly straight, the open radial cell nearly four times as long as broad; hind-wings with an extremely short costal vein, hamuli 1 straight proximal, 5 curved distal; wings extending to about the end of tergite 3. Abdomen very shortly petiolate, shining, very weakly alutaceous, seven visible tergites, none with transverse impressions.

♂. Resembles ♀ except in the following particulars: punctures of head sparser and weaker; antennal sockets as far apart from one another as they are from eyes; antennae much longer, if laid back extending to the posterior margin of scutellum, segments 4–12 of equal length, two and a half times as long as broad, 13 a little longer.

Specimens examined: Type ♀ Liverpool, maize *ex* W. Africa, xii.1916; ♂ wheat London *ex* Fremantle, W. Australia; headless ♂ and ♀ and other fragments, wheat, London *ex* Bombay and *ex* Karachi (B.M.).

I have also examined the following foreign specimens: U.S.A., Indiana, Lafayette, ♀, 1.x.1929 (*L. F. Steiner*); Louisiana, Baton Rouge, ♂, 11.xii.1928 (both determined by Dr. A. B. Gahan); India, Mysore, Bangalore, ♀, ix.1930 (*T. V. Subramaniam*) (said to be *ex* larva flour-moth).

Durrant (1921) incorrectly stated that the type was found in wheat at London, *ex* Bombay. According to Gahan (1931 : 221) the species is probably parasitic on *Tribolium confusum* Duval which is found in the same situations.

Holepyris Kieffer, 1905b.

Resembles *Epyris* Westwood except in the following particulars: mandibles (in British species) with one strong ventral and a hardly developed dorsal tooth. Parapsidal furrows and notaulices not developed. Scutellum separated from mesonotum by a well-marked groove. Ventral furrow of mesopleuron weak posteriorly, stronger in front, incomplete. Tibiae without spines.

Genotype (fixed by Kieffer, 1906) = *Holepyris africanus* Kieffer, 1905b. The genus is found in all the main regions of the world. Nothing appears to be

known of the habits of species of *Holepyris* living out of doors in Europe, but those of *H. hawaiiensis* (Ashmead) have been studied in Hawaii by Bridwell (1920). He found that it attacked the larvae of *Ephestia* and *Plodia interpunctella* (Hb.) (Lepidopt., PHYCITIDAE) in a manner very like *Bethylus*. Richards and Herford (1930 : 382) also found that it would sting *Plodia* larvae, but they did not rear it. A black and white figure of the British species will be found in the above-mentioned paper.

Holepyris hawaiiensis (Ashmead).

Epyris hawaiiensis Ashmead, 1901.
Holepyris hawaiiensis Kieffer, 1905a.

♀. Black; mandibles, antennae, legs and tegulae testaceous; antennal segments 4–13 dorsally and hind femora centrally darker. Wings hyaline with a distinct discal cloud,

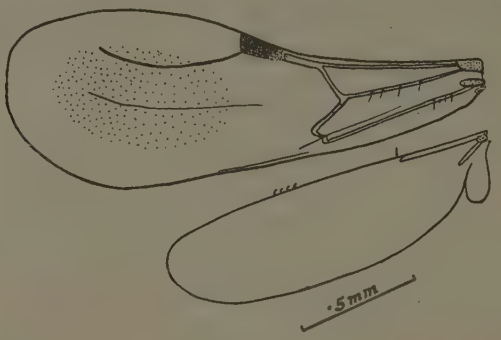

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FIG. 106.—Left wings of *Holepyris hawaiiensis* (Ashmd.) ♀.

pterostigma and veins pale. Pubescence pale, rather sparse (denser on head, pronotum and abdomen) but long and shaggy. Length 2·75 mm.

Head subquadrate posteriorly, but converging strongly in front of eyes, elongate, sides behind the eyes moderately convergent, posterior angles rounded, distinctly broader than the mesonotum, surface dull, closely granulate; eyes hairy, long-oval, separated from mandibles by width of antennal segment 2, from occiput by three-quarters the eye-length; anterior margin of head formed by three rounded lobes, the central clypeal area raised into a very high acute keel which is produced as a fine keel behind antennal sockets to distance as long as antennal segment 2; antennal sockets lying beneath slight tubercles at edge of considerable depressions, sockets separated from one another by almost as much as they are from eyes; antennae with very short pubescence, if laid back extending to posterior margin of mesonotum, segment 1 subcylindrical, curved and considerably thickened distally, three and a half times as long as broad, as long as 2 + 3 + 4, 2 much thinner, clavate, two and a half times as long as broad, nearly as long as 3 + 4, 3 quadrate, 4–12 one and a third times as long as broad, 13 a little longer; ocelli in triangle with posterior side half as long again as other sides; posterior ocelli separated from occiput by about their diameter, median ocellus far behind line drawn through hind margin of eyes. Pronotum about as long as broad behind, nearly three times as long as mesonotum, sides moderately convergent, rounded in front where it sinks a

little and quite gradually to collar, posterior margin very weakly emarginate, in lateral view with a broad, shining depression, dorsal surface dull, alutaceous; mesonotum moderately shining, finely alutaceous, parapsidal furrows and notaulices not developed, a feeble transverse impression on each side at level of tegulae; scutellum flat, finely alutaceous; mesopleuron dull, alutaceous, metapleural suture not crenate; mesosternum flat with a central furrow in posterior half, depression for the reception of the fore coxae slight, not defined; metanotum ("postscutellum") almost completely covered by scutellum, at sides with shallow pits; propodeum with dorsal surface one-third longer than broad, rectangular, defined by strong keels at sides and by very weak one posteriorly, with percurrent central keel and two shorter ones on each side, outer of two being distinctly nearer central keel than margin, surface shining, finely cross-striate, posterior surface flat, triangular with fine central keel, surface finely striate, lateral surfaces moderately shining, finely shagreened. Legs stout, front femora three times as long as thick, tibiae without spines, tarsi cylindrical, claws simple. Fore-wings (fig. 106) with end of R + M not expanded, well separated from pterostigma which is obliquely truncate, about twice as long as broad, costa not produced beyond it, radius feebly curved, open radial cell nearly four

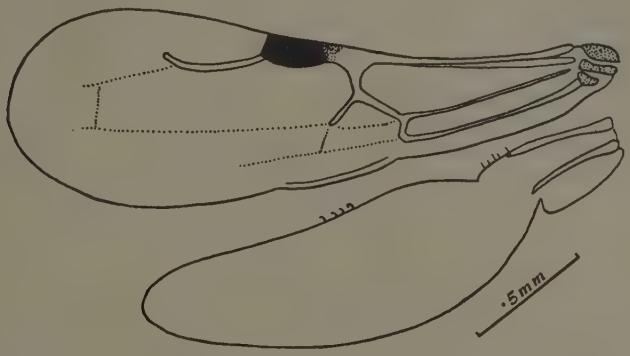

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FIG. 107.—Left wings of *Goniozus claripennis* (Först.) ♀.

times as long as broad. Abdomen with a short but distinct petiole, shining, seven visible tergites.

♂. Not yet described.

Specimens examined: Type ♀ Hawaii (B.M.). London, two different warehouses at Wapping, 12 ♀♀, ix.-x., 1927 and 1928 (*O.W.R.*, *G. V. B. Herford* and *W. S. Thomson*); found in cacao from W. Africa, St. Lucia, Venezuela and Ceylon and in chillies of unknown origin. In these habitats it was almost certainly attacking the larvae of *Ephestia elutella* (Hb.).

Goniozus Förster, 1856.

Small black insects with antennae and legs mainly pale. Fore-wings (fig. 107) with a pterostigma emitting a distally strongly curved radial vein, end of Sc + R + M and the base of M much thickened, second sector of M present, about as long as first, cells Sc + R + M and Cu1 + 1A present, the former considerably the longer; hind-wings with anal vein nearly as long as costal, one distinct straight proximal and four curved distal hamuli. Mandibles truncate with four very small teeth. Antennae with 13 segments. Eyes bare. Ocelli present. Occiput not margined. Mesonotum with no notaulices, parapsidal fur-

rows complete; scutellum not separated from mesonotum by two depressions nor by a distinct furrow. Mesopleuron with a deep circular pit dorsally but without a furrow ventrally. Tibiae not spinose. Propodeum with dorsal surface passing smoothly into lateral and posterior surfaces, feebly defined by keels both at sides and posteriorly. Abdominal tergites 2–4 with weak posterior depressions.

Genotype (fixed by Ashmead, 1893) = *Goniozus claripennis* (Förster) = *Bethylus claripennis* Förster, 1851. The genus is recorded from all the main regions of the world. As far as is known, the species all attack Lepidopterous larvae.

Goniozus claripennis (Förster).

Bethylus formicarius Audouin, 1842 *nec* Panzer, 1806.
B. claripennis Förster, 1851.
Goniozus audouini Westwood, 1874.

♀. Black; mandibles, antennae (except segment 1 proximally and slight darkening of last four segments), tibiae and tarsi, pale testaceous; great part of middle of four hind tibiae and fifth segment of all tarsi, darker; tegulae dark brown; wings hyaline, beyond pterostigma a little darkened; pterostigma, " prostigma," costa and radius brown, other veins yellow. Length 3·0 mm.

Head subquadrate but triangularly produced in front of eyes, sides behind eyes somewhat convergent, posterior angles rounded, about as broad as mesonotum, surface a little shining, finely alutaceous, sparsely punctured (separated by 3–4 diameters), covered with short sparse hairs; eyes long-oval, almost meeting mandibles in front, separated by half their length from occiput; clypeal region strongly triangularly produced, raised into a strong median keel which extends back to point as far behind antennal sockets as length of antennal segment 1; antennal sockets in deep hollows, separated from one another by a little more than they are from eyes; antennae with short sparse pubescence, if laid back not quite extending to posterior margin of mesonotum, segment 1 subcylindrical, little curved, nearly twice as long as broad, as long as 2 + 3, 2–4 considerably thinner, about one and a half times as long as broad, 5–12 a little thicker, about quadrate, 13 as long as 2; posterior ocelli nearly twice as far from one another as from median one, lying on occipital margin, median ocellus just behind line drawn through hind margin of eyes. Pronotum nearly twice as broad behind as in front, where it is regularly rounded, sinking in a steep curve on to anterior collar, about one and two-thirds times as long as mesonotum, sculptured like head, lateral aspect with a large but rather shallow depression whose surface is finely striate; mesonotum sculptured like head, twice as broad as long, notaulices not developed; scutellum flat, finely alutaceous becoming shining behind, with few punctures, without pits or furrow anteriorly; mesopleuron moderately shining, finely alutaceous; metapleural suture not crenate; mesosternum flat, a slight furrow on its posterior third depression for reception of fore coxae, defined posteriorly by a transverse row of about six large punctures; metanotum (" postscutellum ") almost completely covered by scutellum, at sides with small well-defined oval pits; metapleuron moderately impressed, surface dull, alutaceous; propodeum with dorsal surface about quadrate, joining both lateral and posterior surfaces in smooth curves, but both at sides and posteriorly defined by weak keels, surface a little shining, strongly shagreened, with triangular anterior area (extending back for more than half its length) which is brightly shining, posterior surface flat, defined at sides by weak keels, nearly quadrate but sides diverging a little dorsally, surface finely shagreened, disc shining, especially dorsally, lateral surfaces dull, shagreened. Legs rather stout, front femora only two and a half times as long as broad, four posterior femora about four times as long as broad, tarsi cylindrical, fourth segment very weakly bilobed, claws split. Fore-wings with end of R + M and base of M expanded into a triangular

prostigma, separated from pterostigma by a white spot, pterostigma truncate, twice as long as broad, costa not produced beyond it, radius proximally nearly straight, distally strongly hooked, the open radial cell not quite twice as long as broad, end of cells Sc + R + M, Cu1 + 1A, and whole of area beneath main and second sector of M bare of bristles, wings extending nearly to end of abdomen. Abdomen subpetiolate, shining, with sparse short pubescence, seven tergites visible.

Specimens examined: Kent East, Deal, ♀, 12.vii.1903 (*A. J. Chitty*) (M.); Dorset, Branksome Chine, ♀, 16.viii.1865 (*Dale*), Glanvilles Wootton, ♀, 1867 (*Dale*) (H.D.); no locality, 1 ♀, 28.v.1842, 3 ♀♀ no data (H.D.), 1 ♂ (headless) (B. Cooke coll.) (B.M.). One of Audouin's specimens from Montpellier is in the Paris Museum and is part of the material on which *G. audouini* Westwood was based. It was compared with one of Dale's specimens and found to be identical.

The principal hosts of this species recorded on the continent are the larvae of *Sparganothis* (= *Oenophthira*) *pilleriana* (Schiff.) and *Clysia ambiguella* (Hb.). Both these Tortricids are local in this country and are mainly found in a narrow southern strip, the former being subcoastal. Both are found in Dorset where Dale probably obtained all his specimens. The biology has been described in detail by Voukassovitch (1924). When stinging a caterpillar, the female climbs on its back and palpates it; she often sucks at the oviposition-punctures. Between one and eight eggs are laid externally on host larvae 6 to 20 mm. long. Two females kept for record laid 36 and 77 eggs and lived 25 and 40 days respectively. Unfertilised eggs give rise to males. At a temperature of 18–20° C., the period from egg to adult was 36 days. The males mated with the females inside the cocoons of the latter.

Pristocera Klug, 1808.

♂. Moderate-sized insects, black with the abdomen often reddish. Fore-wings with a pterostigma emitting a curved radial vein, end of Sc + R + M not thickened, base of M widely separated from pterostigma, second sector of M not developed, Cu1 distinctly produced beyond point where 1A leaves Cu1 + 1A, cells Sc + R + M and Cu1 + 1A of about the same length; hind-wings with anal vein half as long as costal, with one straight proximal and seven curved distal hamuli. Mandibles subtruncate, with five teeth, the subventral one large, the ventral one still larger. Antennae with 13 segments. Eyes bare. Ocelli present. Occiput margined, the margin completely surrounding the foramen and separated from the buccal cavity by a wide gular area. Mesonotum with complete, straight, parallel notaulices, parapsidal furrows nearly complete; scutellum separated from mesonotum by a deep furrow. Mesopleuron with no dorsal circular pit but ventrally with a faint line separating the sternum from the pleuron. Tibiae not spinose. Propodeum with dorsal surface passing smoothly into lateral and posterior surfaces, though there are feeble lateral keels below the level of the dorsal surface. Abdominal tergites without posterior depressions.

♀ (from the literature). Wingless, usually considerably testaceous, smaller than corresponding males. Mandibles with two large ventral and apparently two small dorsal teeth. Antennae with 13 segments. Eyes very small or absent. Ocelli absent. Head elongate, subrectangular, eyes situated very near mandibles. Occiput not margined. Mesonotum and scutellum very reduced, not very clearly differentiated. Mesopleuron without dorsal pit or ventral furrow. Mid tibiae strongly spinose. Propodeum pyriform, much narrowed in front, inserted into an emargination of the meso-metathorax, dorsal surface not defined by keels. Abdominal tergites without posterior depressions.

Genotype (monobasic) = *Bethylus depressus* Fabricius, [1805] ♂.

Synonym [28]: *Sclerochroa* Förster, 1850. *Type* (monobasic) = *Sclerochroa* (*Scleroderma*) *rufa* Förster, 1850 ♀ = *Pristocera depressa* (Fab.) ♂.

Species of *Pristocera* are found all over the world, except Australia. The habits of the European species are unknown, but those of *P. armifera* (Say) in the United States have been described by Hyslop (1916), who found that it attacks wireworms (larvae of the Elaterid, *Limonus agonus* (Say)).

Pristocera depressa (Fabricius).

Bethylus depressus Fabricius, [1805] ♂.
Sclerochroa (*Scleroderma*) *rufa* Förster, 1850 ♀.
Pseudisobrachium roubali Ogloblin, 1924 ♂.

♂. Black; tergite 1 posteriorly, whole of tergite 2, tergite 3 anteriorly, red, other tergites with posterior margins red-tinged; tegulae testaceous; wings hyaline, veins brown, pterostigma black. Length 9·5 mm.

Head subquadrate, mandibles together forming a rounded lobe in front, sides behind the eyes regularly rounded, head as broad as mesonotum, dull coarsely and confluently punctured, except for smooth space in front of median ocellus, short-oval, rather strongly convex, almost meeting mandibles in front, separated by one and two-thirds times their length from occiput; clypeal region truncate, raised into a very strong median keel which extends back to posterior edge of antennal sockets; antennal sockets in deep hollows, separated from one another by about half their separation from eyes; antennae with short appressed pubescence, if laid back extending well beyond posterior edge of propodeum, segment 1 cylindrical, strongly curved, about two and a half times as long as broad, hardly longer than 2 + 3, antennae tapering distally, especially after segment 8, but proximal segments nearly as thick as 1, 2 a little transverse, 3–8 two and one-third times as long as broad, 9–12 becoming a little longer and thinner, 12 three times longer than broad, 13 almost four times longer than broad; ocelli in equilateral triangle, median ocellus lying on line drawn through posterior margin of eyes, posterior ocelli about equidistant from occiput and sides of head. Pronotum about two-thirds as broad in front as behind, anteriorly sinking abruptly to broad well-defined collar, part behind collar not quite so long as mesonotum, sculptured like head, but punctures tending to form transverse striae; in lateral aspect with a large shallow depression the surface of which is nearly smooth in centre; mesonotum moderately shining, with very strong punctures not quite so close as on head, somewhat broader than long, parapsidal furrows straight, moderately strong, extending across whole length, central lobe to lateral lobes as 2 : 3 : 2, furrow in front of scutellum deep, transverse, well-defined, not crenulate; scutellum nearly flat, rounded-triangular, disc smooth, sides weakly punctured, without pits or furrows; mesopleuron rather dull, coarsely and closely punctured, especially above, below and on sternum with distinct shining interstices, disc without a pit but near the somewhat depressed and crenate meso-metapleural suture with a raised shining lump; sternum strongly depressed with weak median keel in front; metanotum (" postscutellum ") not covered by scutellum, central area small, rugose, broader than long, separated from scutellum by a small bilobed pit and defined at sides by deep, oval pits crossed by one keel; outside these pits are very large lateral depressions which are finely striate; propodeum with dorsal surface about one and a half times longer than broad, joining both lateral and posterior surface in a smooth curve, at sides weakly defined by keel below dorsal edge, posteriorly not at all defined, surface rather dull, with central keel bifurcating posteriorly and system of keels, tending to be arranged longitudinally on anterior half, surface otherwise weakly cross-striate, posterior surface sub-

[28] According to Ogloblin, 1930.

quadrate, slightly convex, weakly cross-striate, lateral surfaces moderately shining with strong diagonal striae. Legs with femora rather stout but three pairs nearly uniform, 5–6 times as long as broad, tibiae thin, not bristly, tarsi cylindrical, fourth segment hardly emarginate distally, claws with rather strong tooth near base. Fore-wings with end of Sc + R + M not expanded, it and C separated from base of pterostigma by a broad hyaline spot, pterostigma elongate oval, nearly four times as long as broad, costa produced beyond very weakly for about half length of pterostigma; radius arising at two-thirds length of pterostigma, proximally strongly curved, then nearly straight, open radial cell twice as long as broad; wings extending to end of abdomen. Abdomen subpetiolate, strongly flattened, with fine pubescence, especially at sides, seventh tergite truncate, tergites deflexed ventrally and nearly covering proximal part of corresponding sternites; sternites more punctured and pubescent, seventh split almost to anterior margin by a deep, narrow incision.

♀ (after Kieffer). Brownish-red, shining. Length 3·6–7·0 mm. Head coarsely and sparsely punctured; antennae short, segment 1 as long as five following together, segment 2 pyriform hardly shorter than 3, 4–12 transverse, 3 and 13 a little more elongate. Pronotum more sparsely punctured than head, almost twice as long as the smooth mesonotum; propodeum smooth, mesopleura strongly swollen. Posterior basitarsus shorter than two following segments together, only twice as long as thick, segment 4 not longer than thick.

Specimens examined: Shropshire, Netley, in the Archdeacon's close, ♂ (*F. W. Hope*) (H.W.).

It is remarkable that this distinct insect has never been recaptured in this country. The above specimen is mentioned by Westwood (1874 : 163). I do not feel completely confident that there is not some confusion as to its source.

Pristocera tricolor (Cameron).

Epyris tricolor Cameron, 1888a : 172.

This species which Cameron described from a single male captured by himself, Hants South, New Forest, vi., apparently belongs, as suggested by Kieffer (1906 : 293), to *Pristocera* and not to *Epyris*. No insect resembling his description has been examined by any later author and the type is apparently lost.

Pseudisobrachium Kieffer, 1905b.

♂. Rather small, black insects with antennae and legs in part brown. Fore-wings (fig. 109) with a pterostigma emitting a long, moderately curved radius, end of Sc + R + M not thickened, base of M widely separated from pterostigma, second sector of M not developed, Cu1 distinctly produced beyond point where 1A leaves Cu1 + 1A, cells Sc + R + M and Cu1 + 1A of about the same length; hind-wings with anal vein very short, less than half as long as costal, 3 proximal (one stronger and more curved) and four curved distal hamuli. Mandibles with one large ventral and four smaller dorsal teeth. Antennae with 13 segments. Eyes hairy. Ocelli present. Occiput not margined. Mesonotum with parapsidal furrows feebly developed posteriorly, notaulices weak, parallel, developed in anterior half; scutellum separated from mesonotum by a deep furrow. Mesopleuron with a large shallow dorsal depression, nearly joined to meso-metapleural suture by a weak furrow, ventrally with no furrow separating off mesosternum, anteriorly with a keel cutting off the prepectus. Tibiae not spinose. Propodeum with dorsal surface passing smoothly into lateral and posterior surfaces, not defined by keels. Abdominal tergites without posterior impressions.

♀ (fig. 108). Wingless, usually more or less testaceous species. Mandibles with two

large ventral and two larger dorsal teeth. Antennae with 13 segments. Eyes very small or absent. Ocelli absent. Head elongate, subrectangular, eyes when present situated very near the mandibles. Occiput not margined. Mesonotum and scutellum very reduced, not clearly differentiated. Mesopleuron without a dorsal pit and without a furrow ventrally. Mid tibiae spinose. Propodeum pyriform, narrowing anteriorly, not inserted in an emargination of meso-metathorax, sides of dorsal surface rather abrupt, though not defined by keels. Abdominal tergites 3–5 with posterior impressions.

Genotype (fixed by Kieffer, 1906) = *Pseudisobrachium laticeps* Kieffer, 1905b. The genus is known from all the main regions of the world. All the species are probably myrmecophilous, but it is not known what rôle they play in the nests.

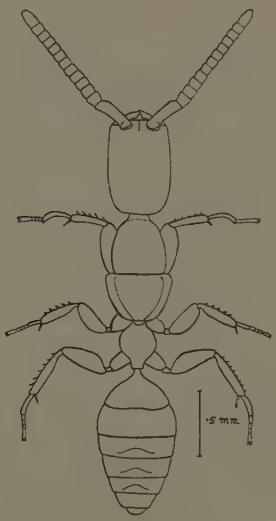

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Fig. 108.—Dorsal view of *Pseudisobrachium subcyaneum* (Hal.) ♀.

Pseudisobrachium subcyaneum (Haliday).

Epyris niger Haliday *in* Walker, 1837 *nec* Westwood, 1832 ♂.
E. subcyaneus Haliday, 1838 ♂.
E. halidaii Westwood, 1874 ♂.
Pseudisobrachium carpentieri Kieffer, 1906 ♂.
P. cantianum Chitty, 1906 ♀. **syn. n.**

♂. Black; mandibles, except proximal half and extreme apex, anterior pronotal collar, tegulae, all femora distally, all tibiae and tarsi, light brown; antennae dark brown, except proximal three-quarters of scape. Margins of abdominal tergites a little testaceous. Wings hyaline, venation brown. Length 5·0 mm.

Head subquadrate, posterior angles rounded, hardly broader than thorax, surface rather dull, finely alutaceous and closely but shallowly punctured (punctures separated by 1–2 diameters), covered with rather close short hairs; eyes rounded-oval, rather sparsely hairy, almost meeting mandibles in front, separated by one and one-third times their length

from occiput; clypeal region a little produced, ventral margin truncate, a small triangular area dorsal to truncation raised and strongly shining; a rather strong keel between antennae ends on shining area before clypeal margin; antennal sockets in deep hollows, separated from one another by little more than they are from eyes; antennae with short, decumbent

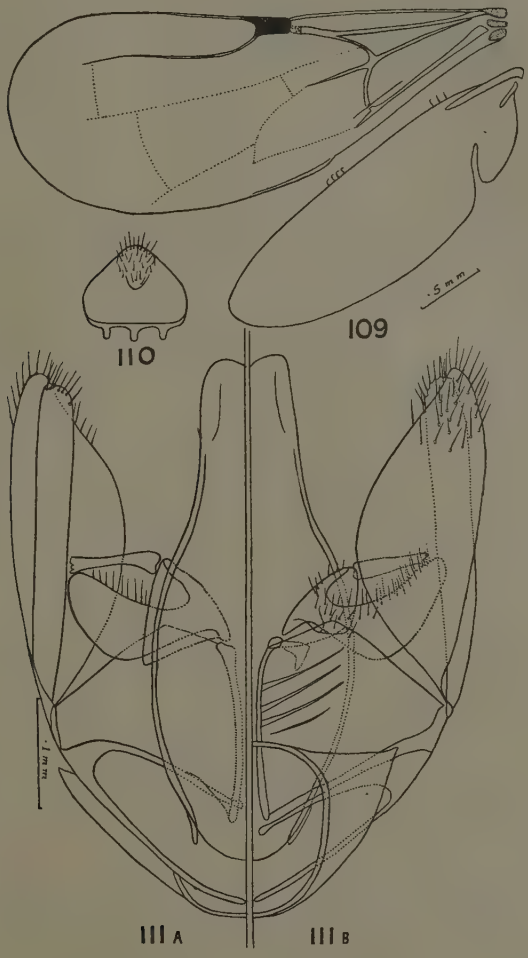

Fig. 109.—Same species, left wings ♂.
Fig. 110.—Same species, ventral view of ninth abdominal sternite ♂.
Fig. 111.—Same species, genitalia, (a) dorsal, (b) ventral view ♂.

pubescence, if laid back, extending to posterior margin of scutellum, segment 1 cylindrical, rather strongly curved, about three times as long as broad, a little longer than 3 + 4, 2 a little clavate, one and one-third times as long as broad, 3 twice as long as broad, 12 more than twice as long as broad, not quite as long as 10 + 11; ocelli in a triangle, posterior

pair nearly twice as distant from one another as from median ocellus, lateral ocelli separated from occiput by one and a half times the POL; median ocellus well behind line through hind margin of eyes. Pronotum twice as broad behind as in front, where it is rounded, sinking rather suddenly on to anterior collar, about one-third longer than mesonotum, sculptured like head but rather shining, lateral aspect with a shallow impression, surface less punctured and more alutaceous; mesonotum sculptured like head but more shining, punctures sparser on disc, about twice as broad as long, notaulices weak, parallel, extending from front margin to point half-way across, separated by width of scutellar furrow; scutellum flat, shining, unsculptured; mesopleuron shining, hardly alutaceous, with large shallow punctures, in centre with shallow depression (nearly joined to metapleural suture by a weak furrow), area above and behind this depression smooth and metapleural suture hardly crenate; mesosternum strongly longitudinally depressed, crossed in front by rather strong keel defining prepectus; metanotum ("postscutellum") in centre with narrow smooth area in front of which is a strongly transverse depression, at sides with large depressions crossed by two strong and a few weak keels; metapleuron very strongly vertically impressed (the pleuron gutter-like), surface shining, weakly striate; propodeum with dorsal surface joining both lateral and posterior surfaces in smooth curves, surface moderately shining, with central keel on its anterior half, on each side of it with 8–9 finer keels which tend to curve outwards, posteriorly surface becoming very finely striate and then nearly smooth, posterior surface regularly but not strongly convex, very weakly transversely striate, dull, lateral surface weakly defined above by slight keel leading back from spiracle, surface shining, weakly striate, especially below. Legs not at all stout, no tarsal segment bilobed, claws simple. Wings with venation pale brown, pterostigma separated from Sc + R + M by a hyaline spot, stigma beyond the spot rather more than twice to nearly three times long as broad, distally rounded-truncate, costa hardly perceptible beyond pterostigma; radius curved proximally, then straight, distally open radial cell fully four times as long as broad; wings extending to end of abdomen. Abdomen subpetiolate, shining, with sparse pubescence, seven visible tergites, none with posterior impressions; ninth sternite and genitalia (figs. 110–111).

♀. Reddish-testaceous, antennae and legs paler yellow. Whole surface with moderately short and sparse, outstanding pale hairs. Length 3·0 mm.

Head subrectangular (with mandibles), nearly twice as long as broad, sides a little convergent before posterior angles which are obtusely rounded, head a little broader than broadest part of mesonotum, eyes and ocelli absent, surface shining, with very distinct punctures, close at sides (separated by 1–3 diameters), sparse on disc (separated by 3–5 diameters), antennal sockets very deep; separated only by knife-like keel which is as long as antennal segments 2 + 3, clypeus very small, truncate; antennae very thick, nearly as long as head + pronotum + mesonotum, segment 1 curved, somewhat thickened distally, about three times as long as broad, as long as 1 + 2 + 3 + 4, segment 2 pyriform, as long as broad, 3 quadrate, 4–12 transverse (4–6 most so), 13 twice as long as broad. Pronotum flat, only a little depressed to receive head, sides little converging anteriorly, about one and two-thirds as long as broad behind, surface shining with rather sparse large punctures which are almost absent from disc, lengths of pronotum : mesonotum : propodeum as 5 : 3 : 3, site of prothoracic spiracle showing as a slight bubble; mesothorax trapeziform, broader in front (where half as broad again as pronotum) than behind where it is joined to propodeum by distinct stalk; mesonotum rounded-triangular, a little longer than anterior breadth, smooth and shining with one row of punctures along each side; mesopleuron very convex, bulging out on each side and almost on same level as mesonotum, shining above, weakly shagreened below; scutellum, metanotum and postnotum not visible dorsally, though some traces of metathorax are still retained on ventral side of propodeum; propodeum in dorsal view oval, narrowing symmetrically to both stalk of mesothorax and to orifice, surface flattened, overhanging sides (so that dorsal is much broader than ventral surface),

smooth and shining, almost unpunctured, about one and a half times as long as broad, sides duller, finely shagreened. Legs short and stout, fore femora about four times, hind femora about twice as long as broad, rather flattened; fore tibiae three-quarters as long as femur, four times as long as greatest tibial diameter, with rather bristly hairs, fore tarsi together not quite as long as tibia, basitarsus strongly curved longer than other tarsal segments together, ending in some stout spines, segments 2–4 weakly cordiform; mid tibia as long as femur, hardly more than three times as long as greatest tibial diameter, outer surface with 12–15 short spines as well as hairs, tarsus as long as tibia, no segment cordiform; hind tibia distinctly longer than femur, about five times as long as greatest tibial diameter, with hairs only, tarsus a little longer than the tibia, no segment cordiform. Abdomen as long as propodeum + mesonotum + ½ pronotum, with seven visible tergites, 2 the largest, 1–2 smooth with sparse hairs, 3–5 with posterior impressions which are weakly angularly dilated in centre.

Specimens examined: Kent East, Charing, near nest *Ponera coarctata* (Latr.), ♀, 2.viii.1903 (*A. J. Chitty*) (M.) (type of *P. cantianum* Chitty, 1906), ♂, 15.ix.1905 (*A. J. Chitty*) (M.), Doddington, in nest *Tetramorium caespitum* (L.), ♂ (*H. St. J. K. Donisthorpe*) (B.M.D.), ♂, 25.ix.1904, and ♂, 25.ix.1905 (*A. J. Chitty*) (M.), Huntingfield, ♂, 4.ix.1905, 2 ♂♂, 10.ix.1905 (*A. J. Chitty*) (M.), Sheppey, ♂, 15.ix.1904 (*A. J. Chitty*) (M.); Surrey, Woking, ♂, (*G. C. Champion*) (B.M.); Is. of Wight, Bembridge, ♂, 14.viii.1908 (H.), Ventnor, ♂ (H.W.) (type, now headless, of *Epyris halidaii* Westwood, 1874); Dorset, Lulworth, 2 ♂♂, 5.ix.1877 (H.D.); no locality, 2 ♂♂ (A. H. H[aworth]) (H.W.), ♂ (H.D.), ♂, viii.1896 (*A. J. Chitty*) (M.), ♂ (Walker coll.) (B.M.); France, Poissy, ♂ (*de Gaulle*) (P.) (lectotype of *P. carpentieri* Kieffer).

The females of *Pseudisobrachium* are always very rare; only two have been recorded in France (Berland, 1928). The single British example was made the type of a new species by Chitty (1906) but it is almost certain that it corresponds to the males which Chitty found in moderate numbers in the same district. Chitty suggests that the males associate with *Myrmecina graminicola* (Latr.) (= *latreillei* Curt.), but it seems quite possible that the species lives with more than one genus of ants.

The French male recorded above is part of the material on which Kieffer founded his *P. carpentieri* and it is here chosen as the lectotype.

13. A revised check-list of the British species.

In the list of British Aculeate Hymenoptera (Richards, 1937), the Dryinidae and Bethylidae now need complete revision, so a new list is here provided.

Dryinidae:

1. *Monogonatopus* Richards, 1939.
   1. *oratorius* (Westwood, 1833).
2. *Donisthorpina* Richards, 1939.
   2. *formicicola* Richards, 1939.
3. *Dicondylus* Curtis, 1829–30.
   3. *bicolor* (Haliday *in* Curtis, 1828).
4. *Pseudogonatopus* Perkins, 1905.
   4. *distinctus* (Kieffer, 1906).
   5. *separatus* Richards, 1939.
5. *Plectrogonatopus* Richards, 1939.
   6. *striatus* (Kieffer, 1905).
6. *Gonatopus* Ljungh, 1810.
   7. *sepsoides* Westwood, 1833.
   8. *barbatellus* Richards, 1939.
7. *Neogonatopus* Perkins, 1905.
   9. *distinguendus* (Kieffer, 1905).
   10. *lunatus* (Klug, 1810).
8. *Tetrodontochelys* Richards, 1939.
   11. *ljunghii* (Westwood, 1833).
9. *Mesodryinus* Kieffer, 1906.

12. *brittanicus* Richards, 1939.
10. *Dryinus* Latreille, 1804.
13. *formicarius* Latreille, 1805.
11. *Prenanteon* Kieffer, 1913.
14. *daos* (Walker, 1837).
15. *ruficornis* (Dalman, 1818).
var. *longicornis* (Dalman, 1823).
var. *melanocera* (Kieffer, 1905).
var. *basalis* (Dalman, 1818).
var. *subapterus* (Kieffer, 1905).
var. *fractinervis* (Kieffer, 1905).
16. *frontalis* (Dalman, 1818).
12. *Anteon* Jurine, 1807.
Subgenus *Anteon s.s.*
17. *brevicorne* (Dalman, 1818).
18. *marginatum* Kieffer, 1905.
19. *brachycerum* (Dalman, 1823).
20. *flavicorne* (Dalman, 1818).
var. *bensoni* Richards, 1939.
21. *jurineanum* Latreille, 1809.
Subgenus *Chelogynus* Haliday, 1838.
22. *infectum* (Haliday *in* Walker, 1837).
23. *scapulare* (Haliday *in* Walker, 1837).
24. *luteicorne* Kieffer, 1905.
25. *rufulocolle* Chitty, 1908.
26. *fulviventre* (Haliday *in* Curtis, 1828).
var. *alutaceum* (Richards, 1935).
27. *ephippiger* (Dalman, 1818).
var. *collare* (Dalman, 1818).
28. *albidocolle* Kieffer, 1905.
29. *lucidum* (Haliday *in* Curtis, 1828).
30. *kiefferi* Chitty, 1908.
31. *cameroni* Kieffer, 1905.
32. *gaullei* Kieffer, 1905.
13. *Aphelopus* Dalman, 1823.
34. *melaleucus* (Dalman, 1818).
35. *serratus* Richards, 1939.
36. *camus* Richards, 1939.
37. *holomelas* Richards, 1939.
38. *nigriceps* Kieffer, 1905.
14. *Embolemus* Westwood, 1833.
39. *ruddii* Westwood, 1833.

Bethylidae :

1. *Cephalonomia* Westwood, 1833.
1. *formiciformis* Westwood, 1833.
2. *hammi* Richards, 1939.
3. *waterstoni* Gahan, 1931.
4. *tarsalis* (Ashmead, 1893).
2. *Bethylus* Latreille, 1802.
5. *cephalotes* (Förster, 1860).
6. *fuscicornis* (Jurine, 1807).
7. *dendrophilus* Richards, 1939.
3. *Plastanoxus* Kieffer, 1905.
8. *westwoodi* (Kieffer, 1914).
9. *munroi* Richards, 1939.
4. *Epyris* Westwood, 1832.
10. *niger* Westwood, 1832.
11. *fraternus* Westwood, 1874.
12. *brevipennis* Kieffer, 1906.
5. *Rhabdepyris* Kieffer, 1904.
13. *zeae* Turner and Waterston, 1921.
6. *Holepyris* Kieffer, 1905.
14. *hawaiiensis* (Ashmead, 1901).
7. *Goniozus* Förster, 1856.
15. *claripennis* (Förster, 1851).
8. *Pristocera* Klug, 1808.
16. *depressa* (Fabricius, 1805).
17. *tricolor* (Cameron, 1888).
9. *Pseudisobrachium* Kieffer, 1905.
18. *subcyaneum* (Haliday, 1838).

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15. Index.

In most cases each specific name has only been indexed with one termination; e.g. *brevicorne* and *brevicornis* are not separately indexed. When a species is referred to more than once the most important reference is printed in Clarendon type.

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